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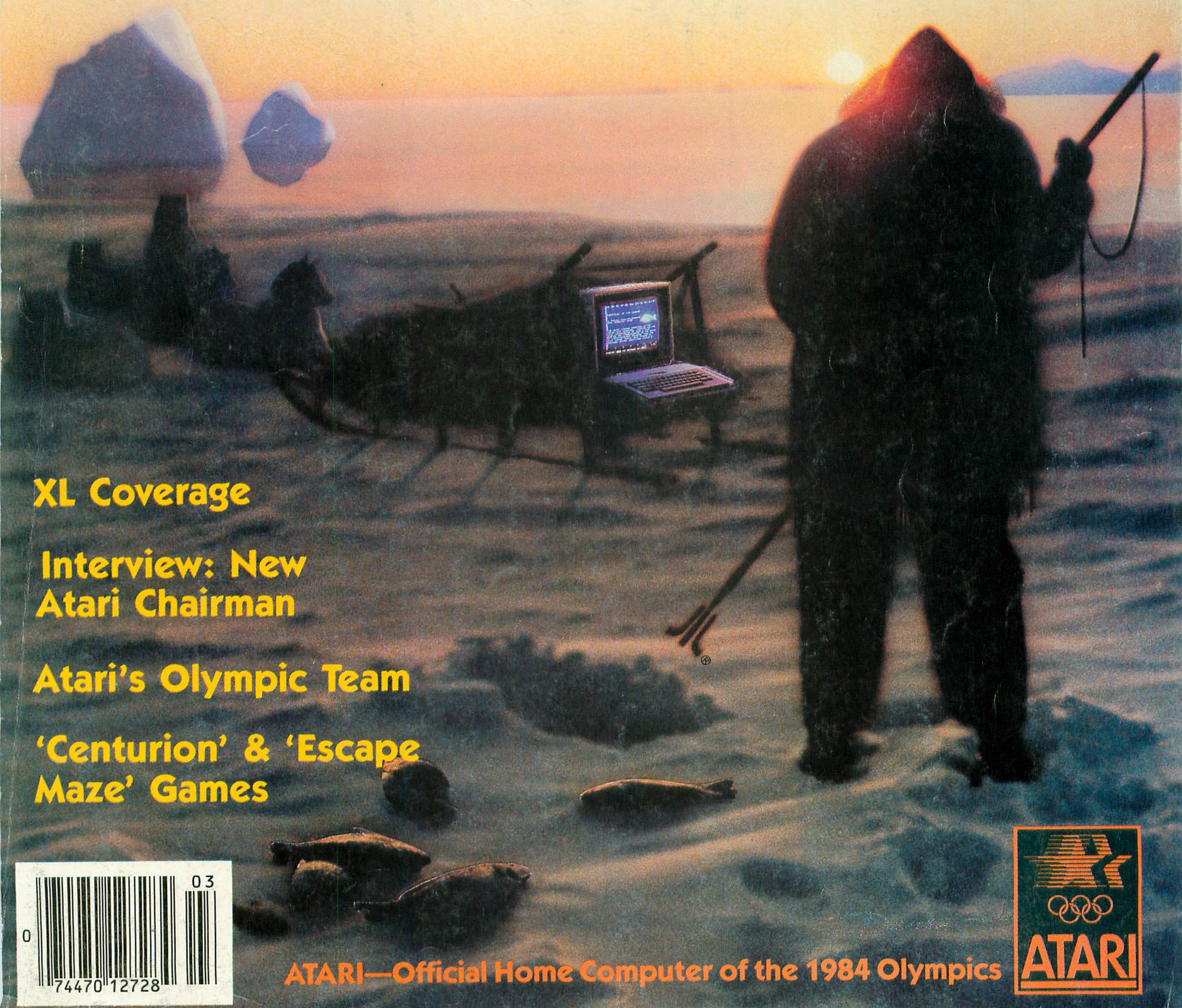
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The ATARI® Resource

MARCH 1984 VOLUME 2, NUMBER 12

THE INTERNATIONAL ATARI
Letters from Around the World



XL Coverage

Interview: New Atari Chairman

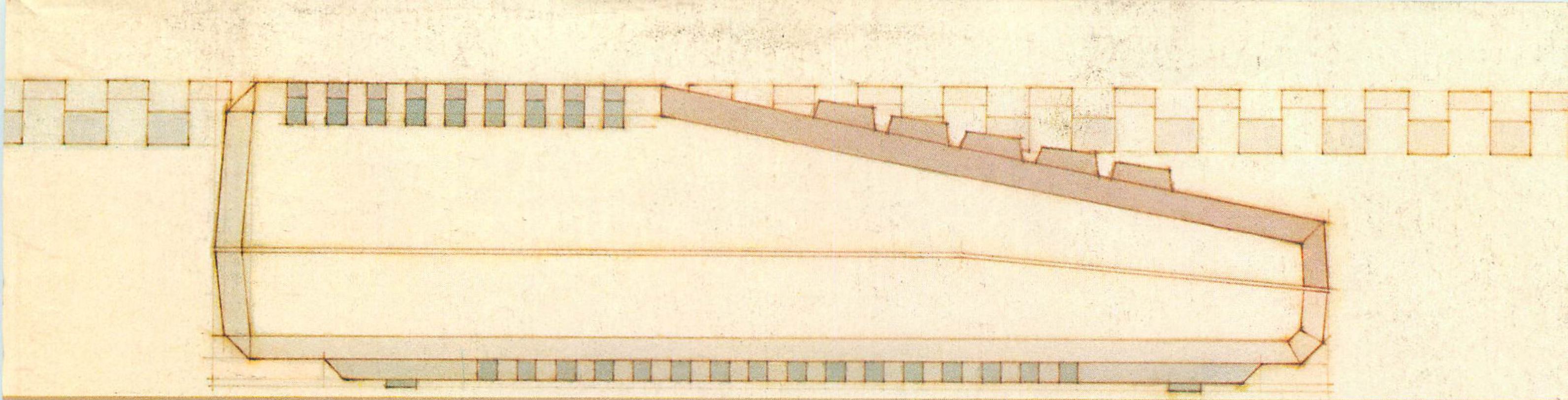
Atari's Olympic Team

'Centurion' & 'Escape Maze' Games

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ATARI—Official Home Computer of the 1984 Olympics

ATARI

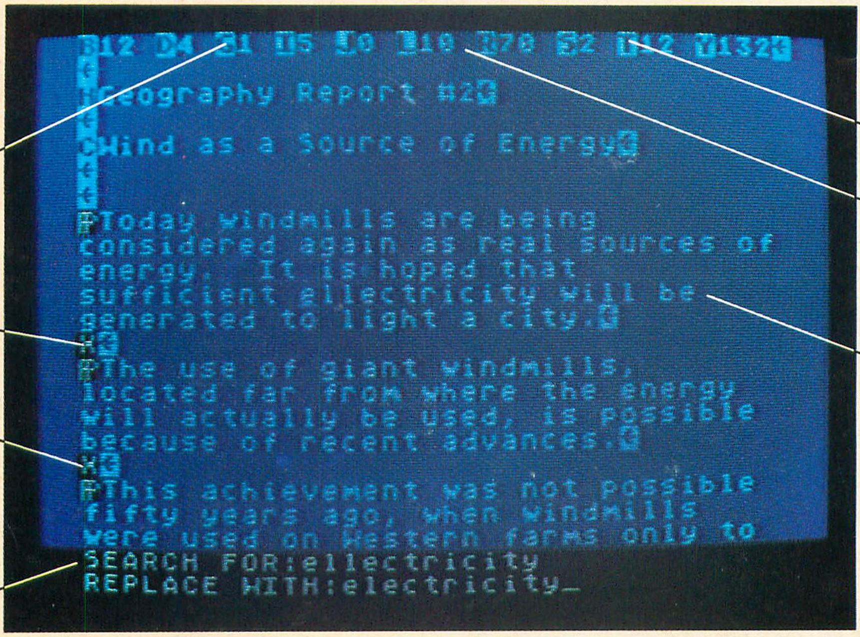


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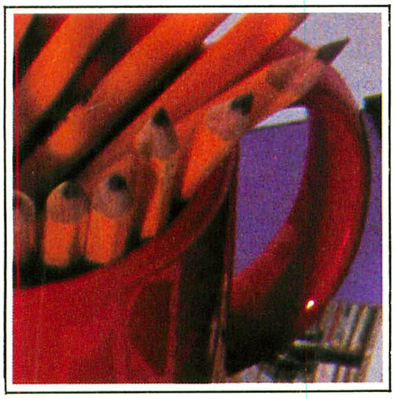


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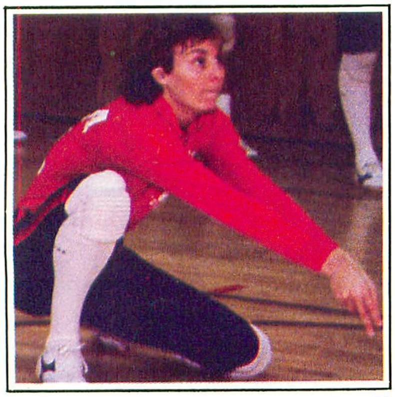
The ATARI Resource MARCH 1984 VOLUME 2, NUMBER 12



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FEATURES

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I/O BOARD

A VOTE FOR COMPUTER PALS

I just read the January I/O Board, and I wanted to let you know that I like the idea of a "Computer Pal" classified section in ANTIC. I'd like to see it broken down into sections of interest, such as adventure games, business, sports, religion, etc.

I've enclosed a graphics program that draws brick buildings and chimneys. It works best as a subroutine, but can also be used as a program in its own right. The color in line 110 is 0 to 4, depending on the graphics mode; the boundaries are also limited by the graphics mode you use.

```
100 GRAPHICS 0:? " INPUT
 GRAPHICS#";:INPUT N
110 ? :? "INPUT COLOR#";
:INPUT C
120 ? :? "INPUT LEFT POS
ITION";:INPUT XMIN
130 ? :? "INPUT RIGHT PO
SITION";:INPUT XMAX
140 ? :? "INPUT TOP POSI
TION";:INPUT YMIN
150 ? :? "INPUT LOWER PO
SITION";:INPUT YMAX
160 ? :? "INPUT BRICK LE
NGTH";:INPUT LBR
170 ? :? "INPUT BRICK HE
IGHT";:INPUT HBR
180 GRAPHICS N:COLOR C:X
=XMIN:Y=YMIN
200 REM DRAW LINES
210 PLOT X,Y:DRAWTO XMAX
,Y
215 Y=Y+HBR:IF Y>YMAX TH
EN 230
220 GOTO 210
230 REM DRAW OFF ROWS OF
 BRICKS
235 Y=YMIN
240 PLOT X,Y:DRAWTO X,Y+
HBR
245 X=X+LBR:IF X>XMAX TH
EN PLOT XMAX,Y:DRAWTO XM
AX,Y+HBR:GOTO 255
250 GOTO 240
255 X=XMIN:Y=Y+2*HBR:IF
Y>YMAX-HBR THEN Y=YMIN+H
BR:GOTO 270
260 GOTO 240
270 REM DRAW EVEN ROWS
275 PLOT X,Y:DRAWTO X,Y+
HBR:X=X+INT(LBR/2)
280 PLOT X,Y:DRAWTO X,Y+
HBR
285 X=X+LBR:IF X>XMAX TH
EN PLOT XMAX,Y:DRAWTO XM
AX,Y+HBR:GOTO 295
290 GOTO 280
295 X=XMIN:Y=Y+2*HBR:IF
Y>YMAX-HBR THEN 310
300 GOTO 275
310 GOTO 310
```

Steve Schehl
Mt. Healthy, OH

WHITHER ATARI?

Can you shed some light on the future of the Atari computers, and on your plans regarding coverage of the discontinued Atari 400/800 lines? Also, will software and peripherals for the 800 (whether made by Atari or not) continue to be available?

We don't hear much about Atari "Down Under" unless we happen to run across some news or hear the latest rumor that's going around.

Thank you for an excellent magazine.

Sgt. Lee Carter
Wallgrove, N.S.W.,
Australia

Despite rumors to the contrary, there is no reason at this time to doubt Atari's commitment to the home computer marketplace. James Morgan, Atari's new president and CEO, outlines this commitment in an exclusive ANTIC interview in this issue.

The 600XL and 800XL computers are currently available in the United States, and the 1450XL is scheduled to appear later this year. Only the status of the 1400XL is uncertain. And after a long and frustrating hiatus, the 850 Interface should be back on the market soon. Finally, at least in the foreseeable future, Atari users should not expect to encounter major difficulties in finding

continued on page 8

software and peripheral devices that are compatible with the 400/800's.

ANTIC plans to continue and expand its coverage of all Atari home computers, including the 400/800 and the new XL models. We also plan to cover any other Atari products that are of interest to the home user. —ANTIC ED

GERMAN, ANYONE?

Is it possible for me to correspond with people who own Atari computers — in German, if possible. I'm 35 years old and own an Atari 400 with 48K. My hobby is computer games, but I'm also interested in programming. Excuse my English, it's not so good. With many hopes to get an answer, and many greetings from Berlin . . .

Siggi Puhlmann
Kienitzer Strasse 32
1000 Berlin 44
Fed. Rep. Germany

AXIOM NOTES

Thank you for the review of Axiom's GP-100AT printer in the January issue of ANTIC. I'd like to add a few points to the review that may be of interest to your readers.

1) The GP-100AT has a built-in Atari interface, cable and connector, so the user does not have to buy an Atari 850 expansion box (or any other interface) to connect directly to any Atari computer.

2) The printer you reviewed was our original 30-cps model, which was supplied to ANTIC for review purposes several months ago. Since then, we've upgraded the speed of the GP-100AT to 50 cps.

3) We've introduced two new printer models, the GP-550AT dual-mode printer and the GP-700AT color printer. The GP-550AT is a multi-function unit designed for home use, and is one of the quietest impact printers on the market. The GP-700AT is a fast color printer that prints up to 25 Atari colors.

4) All of our printers are extensively supported by Axiom's exclusive Graph-AX graphics software package.

Simon J. Harrison,
President
Axiom Corp.
San Fernando, CA

Thank you for your additional information. We feel that the Axiom GP-100AT represents a good value, and are happy with the one we use here in the office. —ANTIC ED

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Sidney Mobell,
Fine Jewelry
San Francisco, CA

COMPUTER PALS II

I'm writing in response to Randy Raymond's letter in the January 1984 issue (I/O Board). Without a doubt, Randy made a very pertinent suggestion. It's been very frustrating to me that ANTIC, which reaches so many Atari users, does not provide a way for its readers to contact each other. After all, owning a computer is not a dead-end situation. I'd like to have a "Computer Pals" section where I could share programs I've written with other ANTIC readers.

I'm not a subscriber to ANTIC, but I do read it regularly. If you decide to go ahead with some type of "Computer Pal" exchange, though, I'll definitely sign up. I then wouldn't want to chance missing a single issue. In the meantime, please use my address if you print my letter. I'd love to hear from other readers.

Robert L. Brown
P.O. Box 1387
Atascadero, CA 93423

Thanks for the input on Randy's "Computer Pals" suggestion. Don't forget that I/O Board and other reader-response sections in ANTIC do provide our readers with a chance to communicate with one another. But we're always open to new ideas. —ANTIC ED

COLORS FROM TAIWAN

I have designed a GTIA program with colors and a beautiful design. You can put this program in ANTIC magazine.

```
5 Z=1
10 GRAPHICS 11
20 FOR I=1 TO 79
30 COLOR Z:IF Z>9 THEN Z=1:
   COLOR Z
40 PLOT I,X:DRAWTO 79-I,X
50 PLOT I,190-X:DRAWTO
   79-I,190-X
60 X=X+2: IF X>190 THEN X=0
70 NEXT I:Z=Z+1:GOTO 10
```

Masahiro Mori
Taichung, Taiwan

Thank you, Masahiro. More can be found on young Mr. Mori in this month's article, "Dear ANTIC." If you want a multicolor version of his program, change line 30 and add line 35 as follows:

```
30 Z=Z+1:IF Z>9 THEN Z=1
35 COLOR Z
```

—ANTIC ED

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TYPO ERASER

If you add the five lines of code below to TYPO (reprinted in ANTIC, page 42, February 1984), they will allow you to: 1) erase the TYPO program from your main program after you have debugged it, and 2) automatically list your program to the screen. To use the program, just type G.32400 after debugging. The additional lines will not affect the TYPO Table.

```
32400 ? "⬉":? :? :CLR :D
IM Q$(15):? "TYPO ERASE
PROGRAM":? :? "PRESS RET
URN TO START":QF=31970:P
OKE 752,1
32410 ? :? "PROGRAM WILL
 LIST AFTER READY PROMPT
":INPUT Q$:POSITION 2,19
:? "POKE 842,12:POKE 752
,0:L."
32420 QF=QF+30:POSITION
2,12:? QF:? QF+10:? QF+2
0:POSITION 0,0:POKE 842,
13:POSITION 2,15:? "CONT
":POSITION 2,10
32430 STOP
32440 POKE 842,12:GOTO 3
2420
```

Philip Diedeman
Phoenix, MD

TELE-CHESS

Many thanks for the game Tele-Chess (ANTIC, May 1983). It really is super.

To give the player a better perspective on the board, I've modified the program slightly. Change lines 1360, 1370, and 1390:

```
1360 BOARD (T,1)=-1
1370 BOARD (T,6)=1
1390 BOARD (T,0)=A:
     BOARD (T,7)=B
```

This sets up the white pieces at the bottom of the screen and the black pieces at the top, instead of having the pieces on the right and left sides of the board, as in the original.

Franklin M. Dresler
Leeds, England

HOOKEY HELPER

I've added a few lines to "Hookey" (ANTIC, September 1983) that make the game more colorful by randomly changing the screen's color every time a new square is filled in. Add these lines:

```
51 GOSUB 20000
20000 AB=INT(RND(0)*5)
20001 AC=INT(RND(0)*65536)
20002 AD=INT(RND(0)*65536)
20003 SETCOLOR AB,AC,AD
20004 SETCOLOR 1,0,0
20005 RETURN
```

Ken Simon
Van Nuys, CA

800 QUESTIONS

Is there a kit that allows the Atari 800 to use an RGB (high-resolution) color monitor?

Also, is there an interface that would allow the 800 to be attached to the tape-output jacks of a preamp to produce graphics or a visual display of the program materials audio frequencies in a bar-graph format?

Finally, is there a system that allows the 800 to be utilized as a video titler and mixer for special effects?

E. Benchimol
Folsom, CA

Austin Franklin (43 Grove St., Ayer, MA 01432) makes an 80-column board for the 800 with an optional RGB interface. See our review in the January 1983 issue.

We don't have the answers to your other questions. Any ideas from our readers? —ANTIC ED

GTIA SKETCHPAD

There is a small error in the circle-drawing routine in "GTIA Sketchpad" (ANTIC, December 1983). The problem occurs when you select a radius that is on a diagonal from the center. The circle, when drawn, skips the designated point on the circumference, because of the unusual shape of the GTIA pixel (four units wide by one unit high). The variable SCALE corrects for the pixel shape, but was missed in the calculation of the circle's radius in line 980. Change 980 to:

```
980 R=SQR(((XD/SCALE)*
    (XD/SCALE))+(YD*YD))
```

William A. Dement
Ft. Clayton, Panama

EPSON ERRORS

I've been a reader of your magazine ever since it started (April 1982), and I like your style and the information you provide. Your printer survey (ANTIC, January 1984) was good, but I'd like to point out several errors that were made in the review of the Epson FX-80. First, the switches on the front are "on line," "form feed," and "line feed" — not "line feed," "top of form," and "select" as was stated in the review. In addition, the review states that "the buffer holds about one line." This is true if the DIP switch 1-4 is "off." If this switch is placed in the "on" position, however, a 2K buffer is available.

I've owned my Epson for 10 months now, and am very pleased with it (although the ribbon needs to be replaced frequently).

Ted Brindle
Indianapolis, IN

MAZE MANIAC

Here are some changes I made to Maze Maniac (ANTIC, August 1983). The changes let the program time your progress through the maze, instead of counting down from 100 seconds. In line 20, change T=T−1 to T=T+1. Add line 245:

```
245 POSITION 1,6:PRINT #6;
    "IN ";T;" seconds"
```

Change TT=100 in line 700 to TT=0. Change POSITION 5,9 in line 240 to POSITION 6,8.

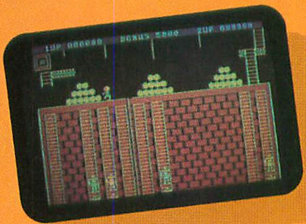
Tim O'Brien
Bergenfield, NJ

SYNAPSE EXCITEMENT

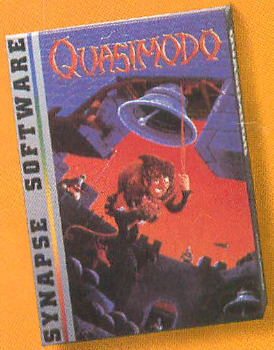


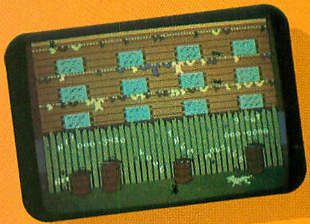
On patrol
Out of the sun comes your RAF biplane, loaded down with a deadly cargo of bombs and bullets. But watch out for the anti-aircraft guns and the enemy fighters—a hit could mean a tricky landing for repairs and ammo. **BLUE MAX.***



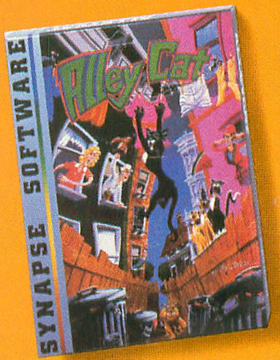


Stop the ringing!
Quasimodo knows who stole the crown jewels. He even knows where they are, but the soldiers just won't leave him alone. Help Quasi dodge the guards and return the jewels to their rightful owner. **QUASIMODO.***



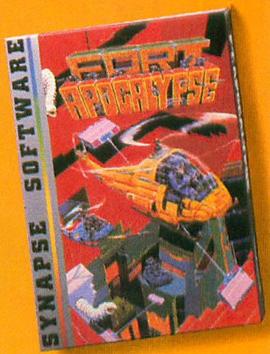


Catastrophic!
Freddy the Cat is busy all day long, getting into trouble every time he jumps in a window. If he's not dodging bottles, bones and shoes he's chasing mice or avoiding that big bully Bowser von Spike! **ALLEY CAT.***





Take the controls
Your helicopter mission—capture vital fuel and weapons, free the enslaved masses, and finally destroy the fortress itself. Will you triumph or be crushed by the fiendish Kraalthan lords? **FORT APOCALYPSE.***

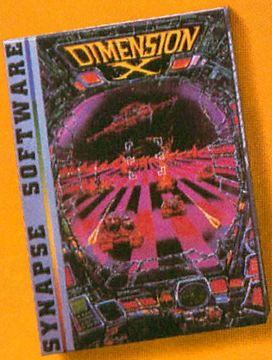


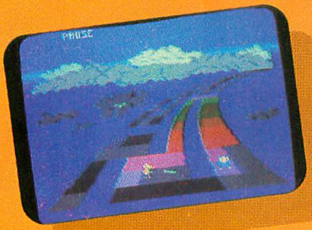
FOR YOUR ATARI!



Surrounded!

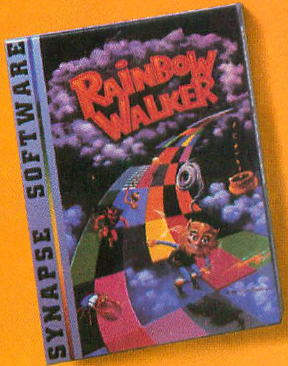
There's nothing like a Rigillian invasion fleet to spoil your day! You just have time to activate the shield envelope and weapons systems before the enemy ships fill the scanner screen. Good luck—you'll need it! **DIMENSION X.***

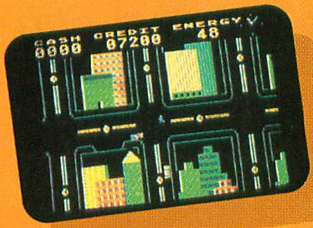




Color the world

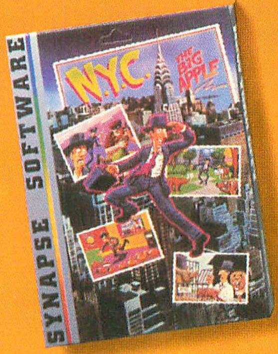
Someone stole all the colors of the rainbow. It's up to Cedrick to put on his magic shoes and hop from square to square putting back the color. But watch out for the Borbuls, the Devils, the Gruebirds and the big holes in the rainbow! **RAINBOW WALKER.***





Big Apple bites back

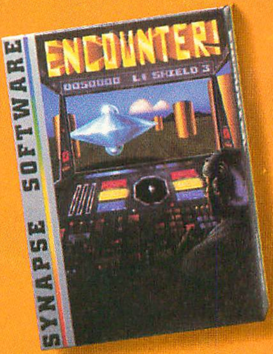
A typical Midwestern tourist takes his first big bite out of the Big Apple. Little did you realize just how much trouble you could get into in broad daylight! **NEW YORK CITY.***





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ATARI INTERNATIONAL

Profits (and perils) abroad

by ROBERT DEWITT
Managing Editor

Atari products and service are available in many, but not all, parts of the world. The job of organizing and administering Atari's international efforts belongs to Atari Products International, a Sunnyvale, Calif.,-based division of Atari, Inc.

The president of Atari Products International, Anton "Tony" Bruehl, has been with Atari since 1979. He was formerly a vice president of one of the Burlington Industries' international divisions. American born, he was schooled in Switzerland and speaks both French and English.

Other Atari International executives include Steve Henick, VP of Sales for Asia and the Pacific area; Jack Beuttell, VP of Sales for Africa, the Americas, the Middle East and Europe; Chris Derring, VP for Marketing and Product Management; and Dumas Simeus, VP for International Business Development. Steve Race, Director of International Marketing, provided much of the information in this article.



SALES & MANUFACTURING

These executives oversee all sales that are made through independent distributors abroad. In addition, Atari operates wholly-owned subsidiaries in the United Kingdom, Germany, France, Italy, the Benelux countries, the Caribbean, Hong Kong and Japan. Sales outside the U.S. account for about 20% of Atari's total business.

All manufacturing of Atari computers currently takes place in Hong Kong, where the joint-venture firm of Atari-Wong produces the 600XL and 800XL models. The government of Hong Kong has specified the Atari as *the* approved computer for use in its public schools. Unfortunately, similar governmental guidelines in many other countries require schools to use locally produced computers, thus excluding Atari computers from a number of educational markets.

Atari cartridges are made in Puerto Rico, and Atari Coin-Op units are assembled in Ireland.

continued on page 16



"Exodus: Ultima III, with a superior plot to match its superior gaming system, is a great game . . . it sets new standards for fantasy gaming state of the art."
Softline, November/December 1983
"Caverns of Callisto is a very challenging and enjoyable arcade game. I hope Origin Systems can continue to provide products of such quality."
Core, December 1983
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Softalk, November 1983
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ATARI INTERNATIONAL
continued from page 14

Atari computers and software currently are available through distributors in Argentina, Australia, Austria, Bahrain, Canada, Chile, Columbia, Denmark, Greece, Guam, Indonesia, Israel, Jordan, Kuwait, Lebanon, Malaysia, New Zealand, Panama, the Philippines, Singapore, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, and the United Arab Emirates.

NEW MARKETS

Surprisingly, Atari game machines are sold in eight countries where Atari computers are not as yet available: Brazil, Cyprus, Finland, Ireland, Norway, Saudi Arabia, Oman, and Qatar. Several of these nations, as well as some countries not mentioned in this article, are expected to open their markets to Atari computers this year. ANTIC estimates that there are currently about 150,000 Atari computers in use outside the United States.

COMPATIBILITY PROBLEMS

Different television standards in different parts of the world are the main obstacle to the international distribution of Atari products. The U.S., Canada and a few other countries use the National Television Systems Committee (NTSC) scheme, which is geared to the use of 60Hz of electricity and 525 horizontal scan lines. In Europe, two systems have emerged. One, called SECAM (Sequential with Memory), is the standard in France, while PAL (Phase Alternate by Line) is standard in Germany, England and many other countries. Both SECAM and PAL use 50Hz of electricity and 625 scan lines. Complicating matters, all three standards use different systems for coding the red, green and blue color components of a TV picture.

This means that Atari computers and game machines must be specially built to meet the television standards in a given market. Software, too, must occasionally accommodate these technical differences.

INTERNATIONAL SOFTWARE

Atari International maintains software development centers in London, Paris and Hamburg, where Atari products are modified, as needed, to meet local requirements, and new products for special markets are acquired. For instance, Atari France recently acquired the video game rights to Obelix and Asterix, two cartoon characters who are very popular in France. And a game program called Lone Raider is distributed only in England.

In some markets, the Atari Operating System has been modified to address the user in the local language — Swedish, for example. A French version of Atari Logo has been prepared for French-speaking countries. Hardcopy documentation is frequently translated into the language or languages of a given geographical market.

THE INTERNATIONAL MARKET

How does the international market differ from the domestic one? Buyers are more serious and practical, according to Steve Race. "Atari computers are more expensive overseas, and people generally have less discretionary income. They legitimize their computer purchases by seeking effective usefulness," he explains.

In the U.S., Atari usually considers itself to be in competition with the TI-99 (now defunct), the Commodore machines and Coleco's Adam. In England it does battle with computers such as Spectrum (Sinclair), Oric, BBC, and Dragon. In France it faces the Thompson and the Matra. Competitive computers in the Asian sphere include Sony, Toshiba and National (all MSX-standard machines) and Sharp.

So far, at any rate, there are no reports of counterfeit Ataris, but the pirating of Atari software is a serious (and common) problem outside the U.S.

Atarisoft products (Atari software titles that are designed to run on non-Atari computers) are doing well overseas; **Pole Position** is the hottest international software item.

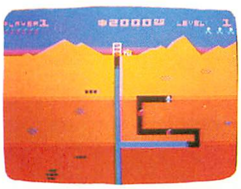
Some countries have erected trade and policy barriers that make it difficult to do business with them. For example, Taiwan prohibits the importation of video games, and in the Philippines you can't advertise them. In France, all TV commercial time must be ordered nine months in advance and commercials are aired whenever the station decides to run them. Israel imposes tariffs of up to 100% of the value of the unit. Each country is a knot of laws, customs, technology, and attitudes that must be untangled if Atari is to make a profit.

Still, Atari International *is* profitable, and intends to stay that way. The result of Atari's resolve should be more goods and services for Atarians abroad, and a growing community of shared interests for all of us.

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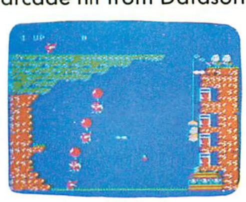
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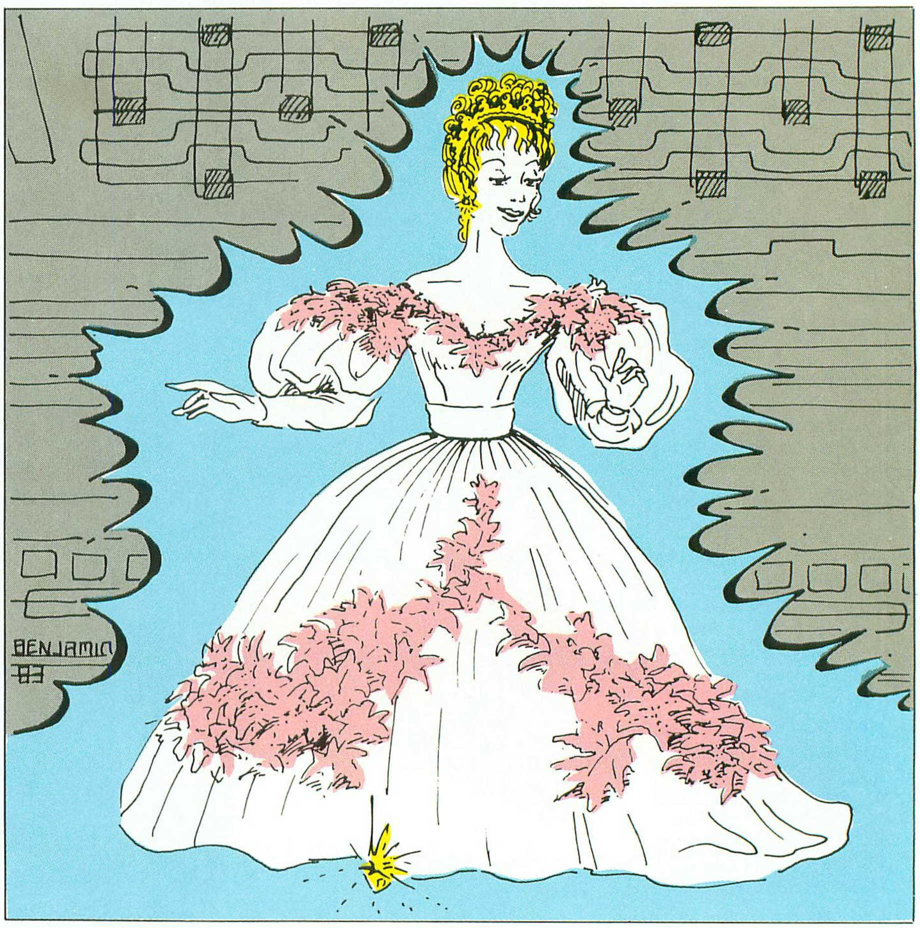
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ATARI'S CINDERELLA

The second half of the saga

by FRED PINHO

This is the second part of a two-part tutorial on the Atari computer Operating System. The program listings run on all Atari computers.



Welcome back! Last month, in Part I of this series, we covered the Atari Operating System (OS) in general and several sections of the OS in detail. In Part II, we'll continue our exploration of each of the main components of the operating system.

THE I/O SYSTEM

This element of the OS is critical to the functioning of the computer as we know it. No matter how powerful a microprocessor is, it's essentially useless if it can't communicate with external devices such as a cassette recorder or TV screen. Atari has set up its central input/output (I/O) system in a very efficient manner. For example, data transfer is handled in the same way regardless of which peripheral device is involved. A new peripheral can be handled by simply adding a new device handler (a program that communicates with the peripheral) to the OS.

The I/O system is composed of a number of sections: the central I/O routine (CIO), the serial I/O routine (SIO), I/O control blocks (IOCB's) and device handlers. The CIO is the entry point for most I/O performed by the computer. It routes I/O requests to the correct device-handling routine.

At the heart of this versatile system are the Input/Output Control Blocks (IOCB's). There are eight of these, each of which is 16 bytes long. BASIC, or the programmer, sets up a specific IOCB for each desired I/O command. Then a call is made to the central I/O routine. Presto, it's done! All BASIC commands that involve I/O to a device, including the monitor screen, are actually performed by the CIO. These include such commands as PLOT, DRAWTO, PUT, GET,

Fred Pinho is a biochemical research engineer and a self-taught programmer who is interested in BASIC and assembly language. The Atari 800 is his first computer.

PRINT and LIST.

IOCB #0 is reserved for the text screen editor. IOCB #6 is used for screen graphics statements (remember the PRINT #6 commands you use to print to a GR.1 or 2 screen?). IOCB #7 is used for LPRINT and program loading and saving. But IOCB's #1–5 are always available for the programmer's use. And much can be done with the standard BASIC commands. The OPEN command tells BASIC how to set up an IOCB for subsequent use. Then you can PRINT, LIST, PUT, etc. to the specific device controlled by that IOCB. However, the CIO is capable of even greater computing power. Unfortunately, the use of machine language is required to access these computing capabilities. BASIC can be used to set up the IOCB for such extended operations, but a short machine-language routine must be used to call the CIO via the USR command.

BASIC'S LIMITATIONS

A limited data-movement capability is available through BASIC (via commands such as OPEN, GET, PUT, etc.). However, GET and PUT affect only one data value at a time. What do you do if you want to SAVE or LOAD a large amount of data in one operation? Say, for example, that you want to save and retrieve a picture drawn on your graphics screen. The CIO has the capability to do this, but, unfortunately, BASIC does not support this valuable application. It can, however, be accomplished through BASIC if you use a short machine-language routine that directly calls the CIO. This technique is illustrated in Listing 2 (Listing 1 appeared in Part 1).

TRY THIS

Lines 31010–31310 of Listing 2 give BASIC the ability to rapidly save and retrieve an entire graphics screen to disk or cassette. Lines 31050–31160 save the screen data; lines 31200–31300 retrieve it. Type RUN and the computer will create a simple drawing and ask you if you wish to save or load a screen. Be sure that your disk or cassette is ready, and then request save. When the operation is finished, type in the following: GR.5:GOTO 31020. The screen will clear and once again you will be asked to choose either save or load. This time, request a load. *Voilà*, it's done! If you use a disk, the screen will load quickly. With the slower cassette, you'll see the screen load in sections.

This program is written for Graphics Modes 2–8 (i.e., only the graphics modes that use a text window). Lines 31060 and 31230 exclude the 160 bytes that contain the text window data. Also, please note that the program saved the graphics-mode value. On loading, this value is checked against the existing graphics mode to insure that there is no mismatch. Finally, the color registers are also saved. As a result, your creation is saved and loaded with the colors of your choice rather than with default colors.

SYSTEM VECTORS

Of all the computer jargon words, "vector" caused me the most trouble when I was new to the field. It was used very often and never explained. Basically, a vector is a pair of memory locations that contain the address of a specific machine-language routine. When the microprocessor needs to run the routine, it goes to these memory locations to find the required address.

The Atari OS is loaded with vectors (both in RAM and ROM). The RAM vectors handle most of the interrupt routines and the disk and cassette boot code. The vectors stored in ROM contain addresses to crucial OS routines and device handlers. RAM vectors can be changed to force the microprocessor to do the programmer's bidding; ROM vectors are fixed and cannot be changed. (The exceptions to this are the ROM vectors for device handlers. During initialization, these vectors are copied into RAM. As a result, the programmer can change addresses or add new addresses in the handler vector table.)

TIMERS

A number of timers are built into the Atari OS. The six that are located in RAM are called software-system timers. These timers are updated during the Vertical Blank Interrupt (VBI). During the VBI, the count in each timer is either incremented or decremented by one. Since this update occurs roughly 60 times per second, the minimum time delay that can be programmed via these timers is 0.0167 seconds. For most of us, this is more than adequate. Incidentally, a sixtieth of a second is commonly called a "jiffy."

The timer that is most readily accessible through BASIC is the real-time clock (RTCLK). This count-up (incremented) timer is located at memory locations 18–20 and occupies three bytes. Location 20 is the least significant byte and is the only one that is incremented during each VBI. When location 20 "overflows" (or goes one past its maximum value of 255), location 19 is increased by one. Similarly, when location 19 overflows, location 18 is increased by one. Note that when a memory byte overflows, it automatically resets to zero. Thus, when RTCLK reaches its maximum value, it automatically resets itself. A count in each register is linked to human time as follows:

Memory Location	18	19	20
Seconds per Count	1094	4.272	0.0167

To use this constantly-counting timer, POKE zeros into the three memory locations. Then PEEK them and convert the values as in the following example:

Total Jiffies = 65536*PEEK(18) + 256*PEEK(19) + PEEK(20)
Total Seconds = Total Jiffies/ 59.92334

Note that we do not divide by 60. I've used the actual VBI time interval, which is close enough to 60 for most purposes. (Listing 3 is a short BASIC program that illustrates the use of the RTCLK.)

The other five software timers are accessed primarily through machine language. All of them are two-byte, count-down timers (maximum count = 18 + minutes). Timers 1 and 2 cause the OS to run on a machine-language subroutine when they have counted down to zero. This is very handy, since the timer counts unobtrusively in the

continued on next page

background while your main program goes about its business. Then, when the timer counts out, your subroutine will automatically do its thing. This is performed during the VBI, so any graphics change will be sharp and clean.

Timers 3–5 simply set a flag byte to zero when they count out. By checking this location, you will know when time is up. These three timers can be accessed directly from BASIC. Due to BASIC's slowness, the timeout check will be rough, but adequate for many purposes. A short demo is given in Listing 4.

Atari offers you an embarrassment of riches, since there are also four timers in the POKEY chip. These "hardware" timers can be used for time intervals much shorter than a sixtieth of a second. They are count-down timers that generate IRQ interrupts and are normally used to generate sound. However, skillful programmers can subvert them to their own purposes.

FLOATING-POINT PACKAGE

This set of OS routines provides the computer with extended arithmetic capabilities. The central processor, the 6502 chip, has limited talents. All it can do is add, subtract and compare two numbers. The higher arithmetic functions, such as multiplication, division and exponentiation, must be handled by machine-language programs that are built around the 6502's capabilities. It would have been inefficient to have required that each language loaded into the computer carry its own floating point package, so Atari installed a special chip in the OS cartridge to take care of this task.

The term "floating point" simply means that you can do math with fractions and decimals. Integer BASIC's are available for some computers. These allow only whole numbers to be used (–128. 4. 3600). There is a price one pays for the increased computing ability provided by the floating-point package: speed. Floating-point BASIC's are slower than integer BASIC's. (Note that Atari BASIC converts all numbers, even integers, to floating-point notation. Thus, you can't gain the speed of an integer BASIC by using only integers in Atari BASIC.)

CHARACTER SET

Also located in the OS ROM cartridge is the so-called character set. The computer does its thing via the binary number system. But very few, if any, humans can communicate meaningfully in this way. So, for the convenience of the human user, the computer converts each number (0–255) to a special character (letter, number, etc.) for display on a peripheral device. The standard convention for this conversion process is called ASCII (American Standard Code for Information Interchange). Atari has modified its code slightly; the Atari version is ATASCII. In essence, each character in the ASCII or ATASCII character set is represented by eight bytes that tell the computer how to display that character. The character set is often fixed in ROM, and a "hard" character set is all that many computers have to offer. However, the Atari allows the programmer to change the character set for his own purposes. Many games use redefined character sets to create their exciting graphics. The basic method used is to copy the ROM set into RAM. Once in RAM, the character bytes can be altered to match your needs. By POKEing into a single memory location, you can instruct the computer to use your character set rather than the ROM version.

EMERGING FROM THE CAVERNS

I hope that this short presentation has given you a better understanding of Atari Operating System. I've also tried to suggest how much Atari computing power is available to the knowledgeable programmer. Much of the power of the Atari OS is available only through machine language, but you don't have to write whole programs in machine code. Wondrous things can be accomplished within the BASIC universe via short machine-language routines that are accessed by the USR command. There is much to explore in the murky caverns of the OS. Have fun!

Listing 2

```
3000 GRAPHICS 5:RESTORE 3040
3010 COLOR 1:FOR Z=0 TO 5:READ X,Y:PLO
T X,Y:READ X,Y:DRAWTO X,Y:NEXT Z:PLOT
29,12:PLOT 29,27:PLOT 28,12:PLOT 28,27
3020 COLOR 2:FOR Z=0 TO 5:READ X,Y:PLO
T X,Y:READ X,Y:DRAWTO X,Y:NEXT Z
3030 COLOR 3:FOR Z=0 TO 7:READ X,Y:PLO
T X,Y:READ X,Y:DRAWTO X,Y:NEXT Z:PLOT
59,12:PLOT 66,12:PLOT 59,27
3035 PLOT 66,27:COLOR 1:PLOT 0,0:DRAWT
O 79,0:DRAWTO 79,39:DRAWTO 0,39:DRAWTO
 0,0:SETCOLOR 0,5,6
3040 DATA 20,12,20,27,21,11,21,28,22,1
0,28,10,22,11,29,11,22,28,29,28,22,29,
28,29
3050 DATA 39,10,46,10,39,11,46,11,39,2
8,46,28,39,29,46,29,42,12,42,27,43,12,
43,27
3060 DATA 60,10,65,10,59,11,66,11,60,2
9,65,29,59,28,66,28,57,12,57,27,58,12,
58,27,67,12,67,27,68,12,68,27
31000 REM **SCREEN SAVE ROUTINE**
31010 DIM T$(1)
31020 ? "DO YOU WISH TO:":? "  SAVE A
SCREEN (TYPE S)":? "  LOAD A SCREEN (T
YPE L)":INPUT T$
31030 IF T$<>"S" AND T$<>"L" THEN 3102
0
31040 IF T$="L" THEN 31190
31050 OPEN #4,8,0,"D:SCREEN1.DAT":REM
OPEN IOCB #4
31060 LAST=PEEK(106)*256-160:REM END O
F SCREEN DATA. TEXT WINDOW(160 BYTES)
IS EXCLUDED
31070 DL=PEEK(560)+256*PEEK(561):START
=PEEK(DL+4)+256*PEEK(DL+5):STARTHI=INT
```

```
(START/256):STARTLO=START-256*STARTHI
31080 REM START OF SCREEN DATA
31090 L=(LAST-START)+1:LHI=INT(L/256):
LLO=L-256*LHI:REM LENGTH OF SCREEN DAT
A
31100 G=PEEK(87):PUT #4,G:REM GRAPHICS
 MODE
31110 FOR X=0 TO 4:PUT #4,PEEK(708+X):
NEXT X:REM SAVE COLOR REGISTERS
31120 POKE 898,11:REM COMMAND FOR PUT
BINARY RECORD
31130 POKE 900,STARTLO:POKE 901,STARTH
I:REM  ADDRESS OF START OF DATA TO BE
SAVED
31140 POKE 904,LLO:POKE 905,LHI:REM LE
NGTH OF DATA TO BE SAVED
31150 X=USR(ADR("hhh*LVd"),4*16):REM C
ALL CIO
31160 CLOSE #4:REM CLOSE IOCB #4
31170 ? "SCREEN SAVED!":END
31180 REM **SCREEN RETRIEVE ROUTINE**
31190 REM SET UP CORRECT GRAPHICS MODE
 FIRST
31200 OPEN #4,4,0,"D:SCREEN1.DAT"
31210 GET #4,G:IF G<>PEEK(87) THEN ? "
GRAPHICS MODE MISMATCH!":CLOSE #4:END
31220 FOR X=0 TO 4:GET #4,C:POKE 708+X
,C:NEXT X:REM COLOR REGISTERS
31230 LAST=PEEK(106)*256-160:REM END O
F SCREEN DATA. TEXT WINDOW(160 BYTES)
IS EXCLUDED
31240 DL=PEEK(560)+256*PEEK(561):START
=PEEK(DL+4)+256*PEEK(DL+5):STARTHI=INT
(START/256):STARTLO=START-256*STARTHI
31250 L=(LAST-START)+1:LHI=INT(L/256):
LLO=L-256*LHI
31260 POKE 898,7:REM COMMAND TO GET BI
NARY RECORD
31270 POKE 900,STARTLO:POKE 901,STARTH
I
31280 POKE 904,LLO:POKE 905,LHI
31290 X=USR(ADR("hhh*LVd"),4*16):REM C
ALL CIO
31300 CLOSE #4:? "SCREEN LOADED!"
31310 END
```

TYPO TABLE

Variable checksum = 273997

Line num range	Code	Length
3000 - 3040	AB	556
3050 - 31060	MD	504
31070 - 31140	AC	509
31150 - 31240	YK	567
31250 - 31310	VN	249

Listing 3

```
500 GRAPHICS 3:POKE 752,1
510 ? "COUNT-UP TIMER";:GOSUB 690
520 POKE 18,0:POKE 19,0:POKE 20,0:REM
SET CLOCK TO 0
530 FOR T=1 TO 700:JF=PEEK(18)*65536+P
EEK(19)*256+PEEK(20):REM TOTAL JIFFIES
540 TS=JF/59.92:REM TOTAL SECONDS
550 HRS=INT(TS/3600):MINS=INT((TS-(HRS
*3600))/60):SECS=INT((TS-MINS*60)+0.5)
560 POKE 656,2:POKE 657,2:? HRS;"  HRS
  ";MINS;"  MINS   ";SECS;"  SECS";
"  ";
570 NEXT T:POKE 656,3:POKE 657,2:? "CO
MPLETED! PLEASE WAIT!":GOSUB 690:GOSUB
 690
580 ? CHR$(125);:REM CLEAR SCREEN
590 ? "COUNT-DOWN TIMER"
600 ? "NUMBER MINUTES DESIRED";:INPUT
MINS
610 ? "NUMBER SECONDS DESIRED";:INPUT
SECS
620 STJF=MINS*3600+SECS*60:REM TOTAL J
IFFIES TO COUNT DOWN
625 POKE 18,0:POKE 19,0:POKE 20,0:REM
SET CLOCK TO 0
630 COUNT=PEEK(18)*65536+PEEK(19)*256+
PEEK(20)
640 JF=STJF-COUNT
650 TS=JF/59.92:HRS=INT(TS/3600):MINS=
INT((TS-(HRS*3600))/60):SECS=INT((TS-M
INS*60)+0.5)
660 POKE 656,3:POKE 657,2:? HRS;"  HRS
  ";MINS;"  MINS   ";SECS;"  SECS";
"  ";
670 IF JF>0 THEN 630
680 ? :? "TIMED OUT!":END
690 FOR X=1 TO 500:NEXT X:RETURN
```

TYPO TABLE

Variable checksum = 178583

Line num range	Code	Length
500 - 570	SS	521
580 - 660	AF	505
670 - 690	VY	77

Listing 4

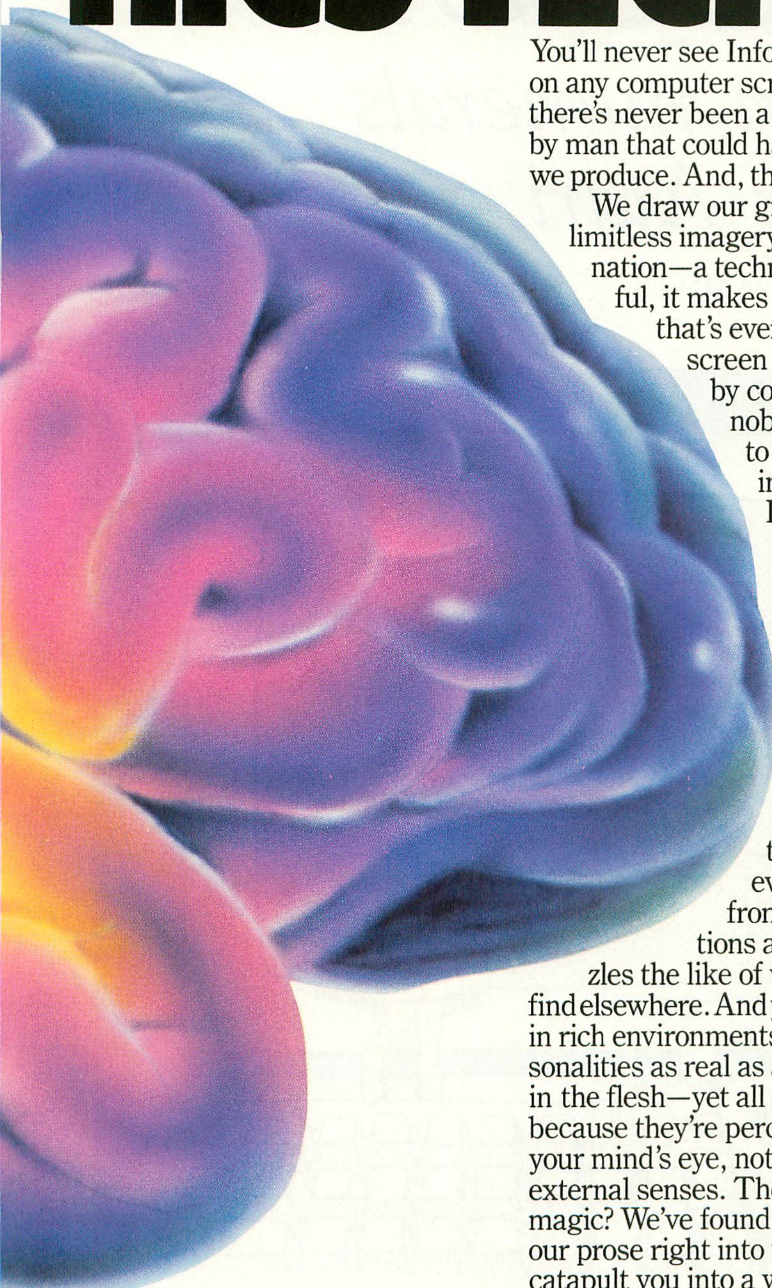
```
2000 DIM A$(1),N$(4)
2010 GRAPHICS 5
2020 LO=32:HI=28:REM NUMBER OF JIFFIES
 IN 2 MINUTES (HI & LO BYTES OF 7200)
2030 ? "TIMER IS SET FOR 2 MINUTES!":?
 "DO YOU WANT A DIFFERENT TIME":INPUT
A$
2040 IF A$="N" THEN 2100
2050 IF A$<>"Y" THEN ? "PLEASE ANSWER
YES OR NO!":GOTO 2030
2060 ? "INPUT TOTAL NUMBER OF SECONDS"
:? "DESIRED(15-999)":INPUT N$:IF VAL(N
$)>999 OR VAL(N$)<15 THEN 2060
2070 A=VAL(N$):JF=60*A
2080 HI=INT(JF/256):REM TIMER HI BYTE
2090 LO=JF-HI*256:REM TIMER LO BYTE
2100 POKE 66,1:REM SET CRITIC FLAG TO
```

continued on page 106

WE UNLEASH TH
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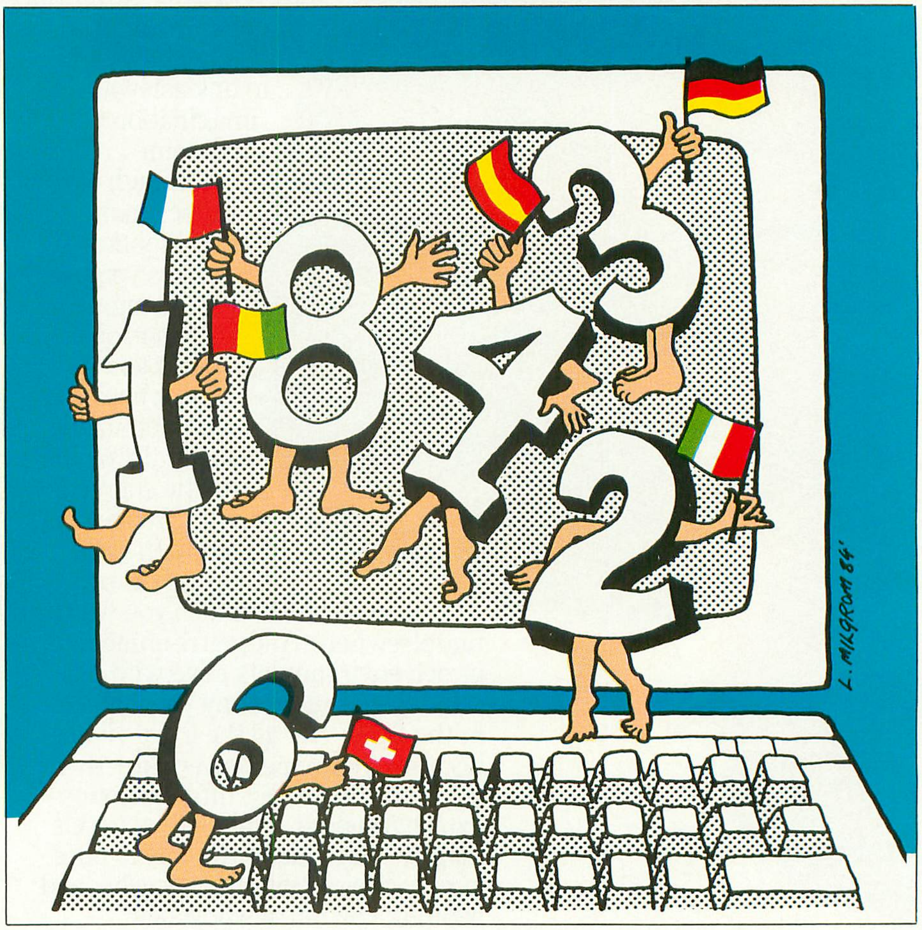
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FLASH COUNT

Learn foreign numerals on your Atari

by JAMES ADAMSON



You no sooner step on foreign soil than you discover the importance of knowing your numbers in the local language — for telling time, spending money, understanding addresses and directions. Yet number drill, especially calculating, is one of the most neglected parts of foreign language education.

Now, Flash Count can be used on your Atari to build this skill. Anyone who can read can learn to associate foreign number words with their corresponding values, and then add, subtract, multiply, and divide these numbers. (This program only uses zero to twelve.)

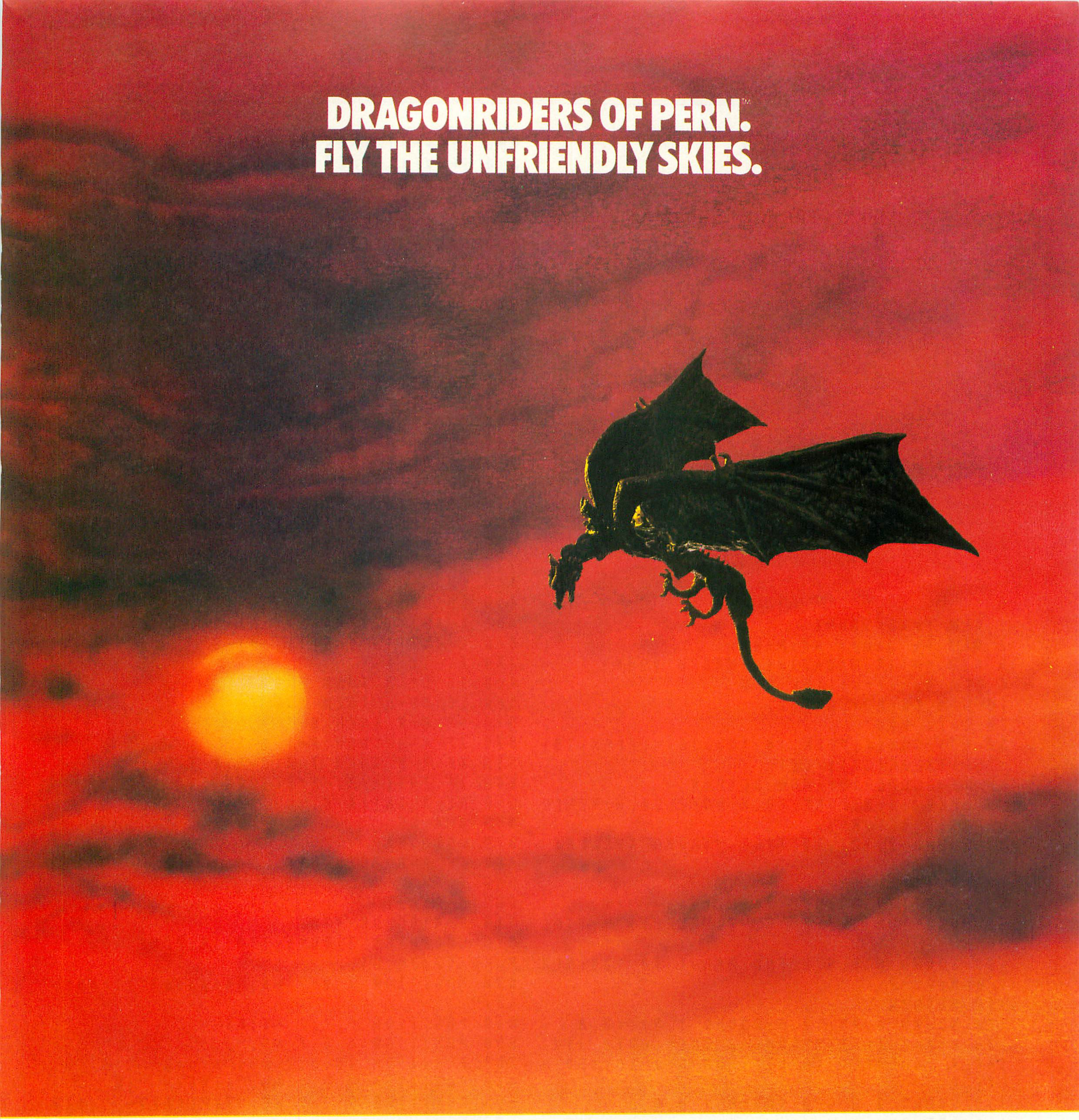
The screen display presents a problem which is written in the spelled version of the foreign numbers. The program user presses the number key (or keys) that corresponds to the correct answer. If the answer is indeed correct, the program goes to the next problem.

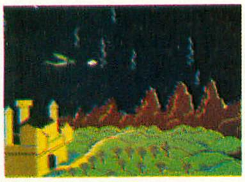
If you don't understand the foreign words, you can type 200 to see the value of the first term in the problem. To see what the second term is, type 400. However, if you need this kind of aid, the computer adds to your "wrong score" to deter you from using this method to answer the problem. You have 180 seconds to work as many of these simple problems as you can. The screen displays a ranking (novice to expert) based on your score, after your time has expired. This gives you a mark to compete against the next time you try the program.

The program as listed presents problems in Spanish, but French or other foreign words can be substituted easily. All you have to do is change the words assigned to B$ and D$ on lines 170 to 290. Foreign word equivalents to numbers in French and German follow.

continued on page 26

James Adamson is a 15-year-old programmer who lives in North Huntington, PA. His father, George Adamson, is also a member of the ANTIC family of writers.





Shooting down the menacing and constantly multiplying Threads isn't easy, but it's only one of the challenges in this official computer game version of Anne McCaffrey's famous book series.

Your strategy will be put to the test as you try to negotiate alliances with Pern's Lord Holders in an attempt to form the most powerful Weyr on the planet. Should you take a firm stance or compromise? Will asking a Craftmaster for assistance increase your chances for success? Maybe you should invite prospective allies to a Wedding or even a Dragon Hatching. Remember to check the Lord Holders personality traits first. It may be critical to your success.

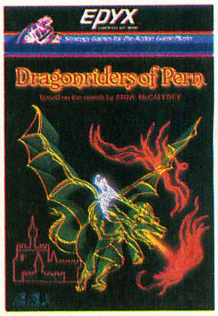
Numerous screens combine to create truly unique and challenging game play. There's even a practice screen to sharpen your Thread Fighting skills.

If you liked the books, you'll love the game. After all, how often do you get the chance to actually fly a dragon?

One to four players, joystick and keyboard controlled.

EPYX™ COMPUTER SOFTWARE

Strategy Games for the Action-Game Player



FLASH COUNT continued from page 24

NUMBER	FRENCH	GERMAN
0	zero	null
1	un	eins
2	deux	zwei
3	trois	drei
4	quatre	vier
5	cinq	fünf
6	six	sechs
7	sept	sieben
8	huit	acht
9	neuf	neun
10	dix	zehn
11	onze	elf
12	douze	zwölf

Requires 16K RAM

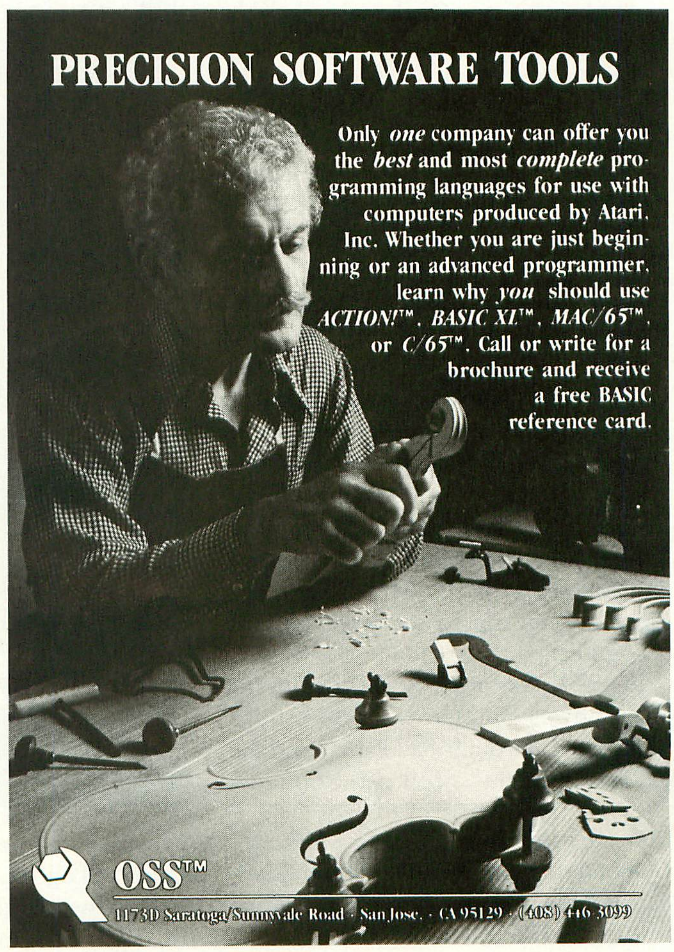
```
1 REM FLASHCOUNT
2 REM by James Adamson
3 REM ANTIC MAGAZINE  MARCH 1984
4 REM Requires 16K RAM
10 DIM C$(20),B$(10)
20 GOTO 840
30 NOW=INT(((PEEK(18)*65536)+(PEEK(19)
*256)+PEEK(20))/60)
40 TIMEGONE=180-NOW:RETURN
50 POKE 18,0:POKE 19,0:POKE 20,0:TIMEG
ONE=180:RETURN
60 SOUND 0,121,10,14:? "WRONG ANSWER!
TRY AGAIN!"
70 W=W+1
80 POSITION 10,9:? #6;"wrong= ";W
90 POSITION 3,7:? #6;"TIMELEFT= ";TIME
GONE
100 SOUND 0,0,0,0:FOR WGR=1 TO 130:NEX
T WGR:? :?
110 RETURN
120 SOUND 0,96,10,8:SOUND 1,81,10,8
130 R=R+1:IF TIMEGONE<0 THEN GOTO 310
140 ? "CORRECT INPUT":FOR D=1 TO 150:N
EXT D
150 SOUND 0,0,0,0:SOUND 1,0,0,0
160 RETURN
170 POKE 710,14:IF V=0 THEN B$="SERO"
180 IF V=1 THEN B$="UNO"
190 IF V=2 THEN B$="DOS"
200 IF V=3 THEN B$="TRES"
210 IF V=4 THEN B$="CUATRO"
220 IF V=5 THEN B$="CINCO"
230 IF V=6 THEN B$="SEIS"
240 IF V=7 THEN B$="SIETE"
250 IF V=8 THEN B$="OCHO"
260 IF V=9 THEN B$="NUEVE"
270 IF V=10 THEN B$="DIEZ"
280 IF V=11 THEN B$="ONCE"
290 IF V=12 THEN B$="DOCE"
300 RETURN
310 C$="NOVICE"
320 IF R=0 OR TI<20 THEN 370
330 RANK=INT(100*W/TI)
340 IF RANK<26 THEN C$="AVERAGE"
350 IF RANK<16 THEN C$="MUY BIEN"
360 IF RANK<9 THEN C$="ESPANOL MATH WH
IZ"
370 GRAPHICS 2:POKE 53774,112:POKE 16,
64
380 POSITION 2,2:? #6;"YOUR RANK IS...
":Z=Z+4:IF Z>243 THEN Z=29
390 SOUND 0,Z,10,14
400 POSITION 2,4:? #6;C$:POSITION 2,6:
? #6;"TOTAL RIGHT= ";R:POSITION 2,8:?
#6;"TOTAL WRONG= ";W
410 POKE 708,INT(256*RND(1))
420 ? "PRESS START TO BEGIN!":IF PEEK(
53279)=6 THEN 840
430 GOTO 380
440 END
450 GOSUB 50
460 A=INT(13*RND(1)):A1=A
470 B=INT(13*RND(1)):B1=B
480 TI=TI+1
490 IF OP<3 THEN 610
500 IF OP=3 THEN 580
510 IF B=0 THEN B=1
520 IF A=0 THEN A=1
530 IF A<B THEN T=B:B=A:A=T
540 IF INT(A/B)=A/B THEN 610
550 RE=A-INT(A/B)*B
560 A=A-RE
570 GOTO 610
580 IF A>B THEN 610
590 T=B
600 B=A:A=T
610 V=A:GOSUB 170
620 GRAPHICS 2:POKE 710,14:POKE 16,64:
POKE 53774,64
630 POSITION 1,0:? #6;"espanol flashca
rds"
640 POSITION 6,2:? #6;B$
650 POSITION 4,5:? #6;"_________"
660 POSITION 10,9:? #6;"wrong= ";W
670 POSITION 0,9:? #6;"right= ";R
680 POSITION 3,7:? #6;"TIMELEFT= ";TIM
EGONE
690 V=B:GOSUB 170
700 ON OP GOTO 710,760,740,780
710 POSITION 5,4:? #6;"+ ";B$
720 C=A+B
730 GOTO 800
740 POSITION 5,4:? #6;"- ";B$
750 C=A-B:GOTO 800
760 POSITION 5,4:? #6;"* ";B$
770 C=A*B:GOTO 800
780 POSITION 5,4:? #6;"/ ";B$
790 C=A/B
```

```
800 TRAP 800:POKE 764,255:POKE 702,64:
POKE 694,0:? " INPUT YOUR ANSWER NOW ?
??";:INPUT C1:? "↖"
810 IF C1<>C THEN GOSUB 60:GOSUB 30:GO
SUB 2000:GOTO 800
820 GOSUB 30:GOSUB 120
830 GOTO 460
840 GRAPHICS 1+16:POKE 710,14:POKE 708
,121:S=50:POKE 16,64:POKE 53774,64
850 TI=0:R=0:W=0
860 POSITION 1,0:? #6;"espanol FLASHCA
RDS"
870 SOUND 0,162,10,8:SOUND 1,108,10,6:
SOUND 2,128,10,6
880 FOR Z=1 TO S:NEXT Z
890 POSITION 1,3:? #6;"by JAMES ADAMSO
N"
900 POSITION 1,6:? #6;"(c) 1983 by ANT
IC"
910 SOUND 0,182,10,6:SOUND 1,182,10,6:
SOUND 2,144,10,6
920 FOR Z=1 TO S:NEXT Z
930 POSITION 3,9:? #6;"---press---"
940 POSITION 3,12:? #6;"(a) for +"
950 POSITION 3,14:? #6;"(s) for -"
960 SOUND 0,243,10,6:SOUND 1,96,10,6:S
OUND 2,162,10,6
970 FOR Z=1 TO S:NEXT Z
980 S=INT(121*RND(1))
990 FOR T=0 TO 3:SOUND T,0,0,0:NEXT T
1000 POSITION 3,16:? #6;"(m) for *"
1010 POSITION 3,18:? #6;"(d) for /"
1020 DE=PEEK(764)
1030 IF DE=63 THEN OP=1:GOTO 450
1040 IF DE=37 THEN OP=2:GOTO 450
1050 IF DE=62 THEN OP=3:GOTO 450
1060 IF DE=58 THEN OP=4:GOTO 450
1070 POKE 708,INT(255*RND(1))
1080 GOTO 860
2000 IF C1=200 THEN POSITION 14,2:? #6
;"(";A;")"
2010 IF C1=400 THEN POSITION 14,4:? #6
;"(";B;")"
2020 RETURN
```

TYPO TABLE

Variable checksum = 359799

Line num range	Code	Length
1 - 80	AD	424
90 - 200	MA	472
210 - 320	LI	294
330 - 420	LC	509
430 - 540	YB	270
550 - 660	EH	345
670 - 780	OX	371
790 - 870	HA	507
880 - 970	ZV	510
980 - 2000	IV	440
2010 - 2020	OY	60



LOGO'S LINEAGE

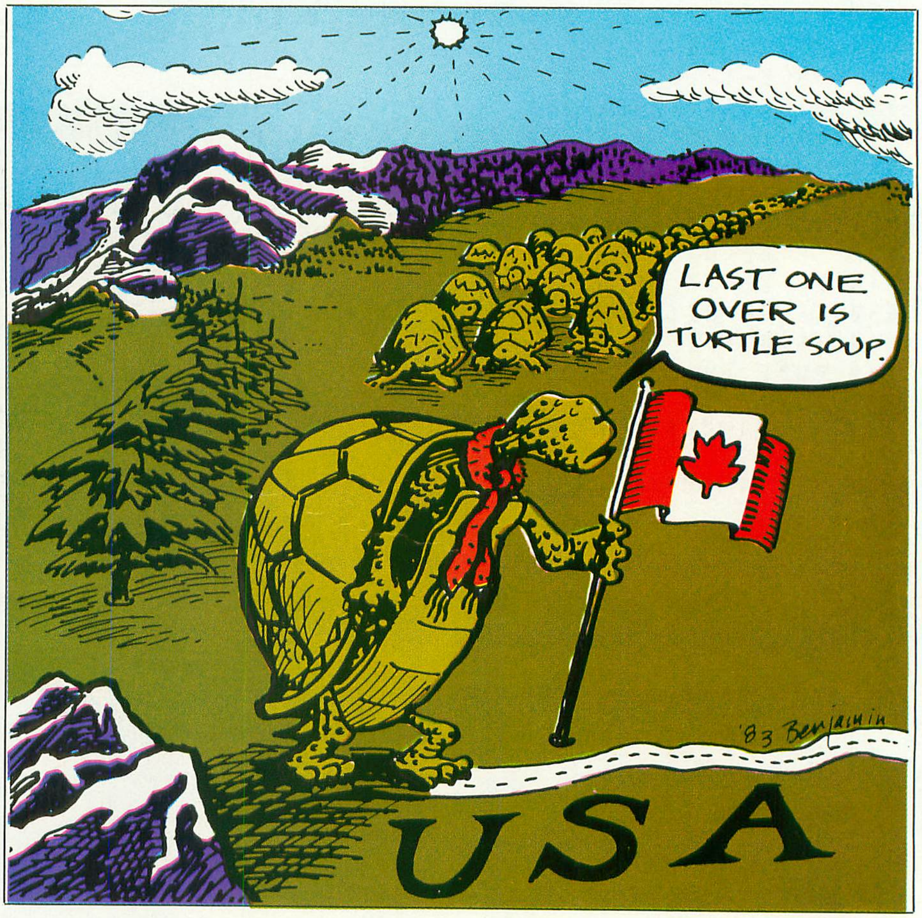
The Canadian connection

by IAN CHADWICK

The Canadian association with the Logo computer language is almost as old as that of Logo itself. The story begins with Guy Montpetit, a Quebeçois, and his friend, Seymour Papert, who both studied under theorist Jean Piaget in Geneva back in the early 1960's. Papert left Geneva to work and study at MIT, while Montpetit started a few small businesses, including a research lab in Montreal. They stayed in touch.

In 1970, the Logo group was established within the Artificial Intelligence Lab at MIT. Shortly after, in 1971, Montpetit decided to introduce Logo into Canada. In Ottawa, he managed to connect up to a mainframe government computer, a PDP-11; his system used terminals at a school in Longueil, one of Montreal's eastern suburbs. His work with Logo there stirred much interest, and members of the MIT group frequently came up to see what he had accomplished.

In 1974, Guy took time off from his Ottawa work and moved to Boston, to be closer to his old friend Papert and the MIT experiments. Montpetit soon realized the need for finding an implementation of Logo that would make it acceptable to the world outside the university. In 1980, back in Canada, he formed a company called SGT (General Turtle Corporation) and got a contract to design and manufacture business com-



Ian Chadwick resides in Toronto, Canada, and is the author of the excellent reference text, Mapping the Atari *from COMPUTE! Books.*

continued on page 30

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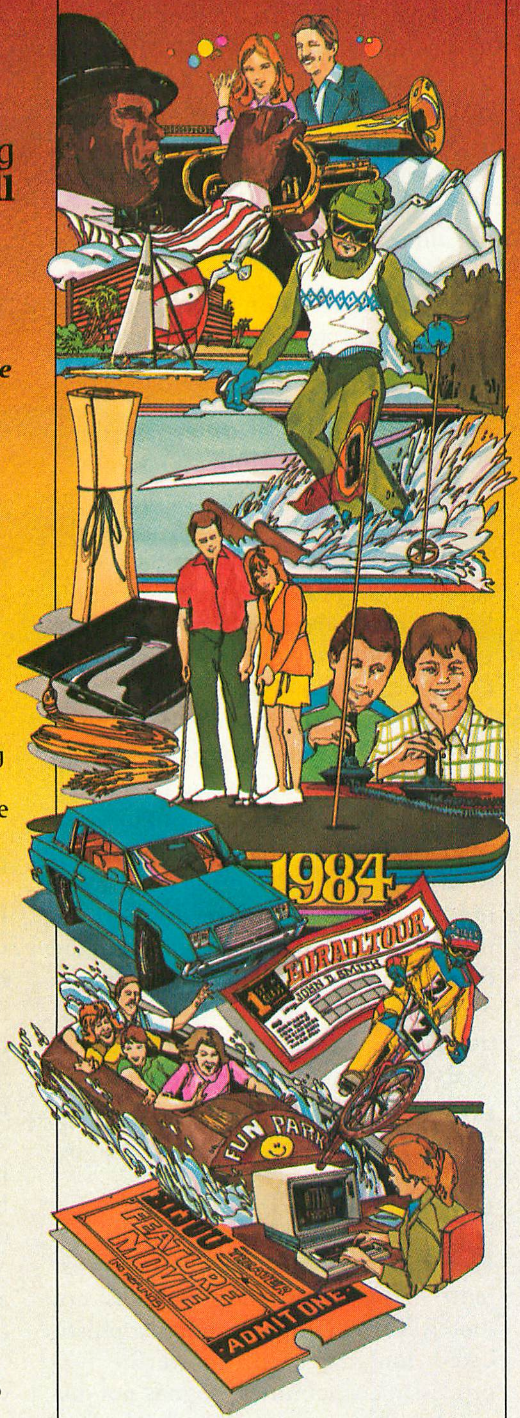
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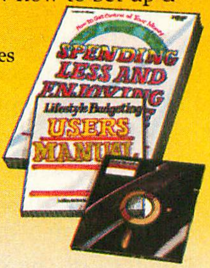
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LOGO'S LINEAGE
continued from page 28

puter work stations that used Logo as the operating language. With SGT, Montpetit developed a number of business applications for Logo, including a word-processing package. But response from buyers was too small to keep the company afloat, and SGT soon went bankrupt.

KITCHEN COMPANY

Undaunted in his faith that Logo was an important computer language, Montpetit convinced Papert and other MIT players — Marvin Minsky, Cynthia Sulliman, and Brian Silverman (another Canadian) — to found Logo Computer Systems Inc. (LCSI) in Montreal. The new company, formed across a kitchen table one evening, was dedicated to creating a new implementation of Logo that would run on the Apple computer. MIT had already licensed Texas Instruments, Terrapin, and Krell to sell a microcomputer version of Logo, but what LCSI was after was a new, reconstructed implementation, something redesigned from the ground up on their LISP-based computers.

The LCSI group sought out local talent to help them develop the company. In order to give the company a marketable image, they brought in Jim Baroux, a veteran of the corporate world with extensive sales and marketing expertise. To stay close to MIT development, LCSI maintained a lab in Boston, where Papert and Minsky worked. Papert became the media spokesman for both Logo and LCSI, a role Baroux created, because he saw the new company's need for an articulate expert who could talk to the press, to governments, and to educators with authority. Baroux's efforts were so successful that Logo became a conversation item for people who didn't even own a computer!

LOGO ASCENDING

Meanwhile, under Brian Silverman's sleepless efforts, LCSI polished up and brought forth its first product: Apple Logo. This was sold to the Apple Computer Corporation and marketed under Apple's own label, a unique contract for the industry at that time.

The public response was enthusiastic, and Logo became a respected term in the vocabulary of educators. This version was to win LCSI the Best Microcomputer Software of the Year Award, presented by the Learning Periodicals Group. Apple Logo again gained prominence when Apple chose it as the only software to accompany their give-away computers to schools in the "Kids Can't Wait" program.

Not long after Apple Logo's release, LCSI found itself at the center of world attention, with major corporations asking almost daily for an implementation for their machines. Japan, in particular, has been interested in Logo, and many Japanese executives and researchers have come to Canada to work with LCSI.

By mid-1983, LCSI had 15 contracts to develop Logo for various machines: the IBM-PC, Atari 400/800/1200XL, DEC's Rainbow and 350, Europe's large Thomson Brandt company's model TO-7, the Fujitsu computer, Coleco's Adam, the Timex Spectrum, an Apple Sprite Logo (a version with graphics to challenge TI's or Atari's), a Music Logo, and more.

Brian Silverman proved to be the guiding light of Logo's technical development. Tireless, brilliant and farsighted, Brian has been offered positions by many of the major computer companies. Loyal to LCSI however, Brian began developing an entirely new version of the memory-hungry language for use in the educational field. Brian foresees this as a huge potential market. The first product to use this new implementation is Atari Logo, a surprisingly powerful program packed into a tiny 16K of ROM. (Apple Logo takes 48K!)

SOPHISTICATED LOGO

From the beginning, LCSI has consistently pointed out that Logo is not merely Turtle Graphics, but a sophisticated language with powerful list-processing capabilities. Logo is not just another PILOT, a language designed to allow educators to develop curriculum and lesson programs. Nor is it simply a "kid's" language, as many outsiders imagine it to be. Instead, it is a fully-expandable language based on the science of learning.

The big dream of LCSI is to see Logo replace BASIC as the language of choice for computing. Jean Pierre Brunet, head of LCSI's Apple products division, says that they are "trying to package and sell thought." He expects Logo to be for the home market "what VisiCalc has been to the business market."

LCSI's position in Canada has not gone unchallenged, however. Recently, Waterloo University released a version of Logo for the IBM computer. This professional, powerful version reflects Waterloo's position as the finest computer-science school in Canada.

Ontario's educational computer, designed and manufactured by CEMCorp, will sport a new version of Logo for its 16-bit networking system. So far, no one has been named as the developer, but certainly Waterloo and LCSI are in the running. So is a new company, Human Computer Resources, whose Richard Miller is responsible for writing a Logo which may be upgraded for the new computer. This lucrative CEMCorp contract would insure Logo a place in Ontario schools, since the government has guaranteed an initial equipment purchase of $10 million.

COMPETITION LOOMS

LCSI's most serious competitor, in their own eyes, is not a Canadian company, but rather Digital Research, which is based in California. The company that brought us CP/M has also released Logo for the IBM-PC. LCSI sees DR as having the market credibility to present a solid challenge to their sales. However, LCSI also believes that having DR on the Logo bandwagon will lend credibility to the language.

Meanwhile, independent groups such as the Logo Special Interest Group (SigLogo) of the Educational Computing Organization of Ontario (ECOO), are working to spread the interest in Logo into Ontario schools. This group has scheduled a research conference at

Queen's University in Kingston and expects individuals from across North America to present papers about their work with Logo.

Dr. Bill Higginson at Queen's produces the SigLogo newsletter, *LOGO-Phile*, an erratically scheduled publication which is surprisingly full of Logo information and gossip. Higginson also heads a Logo research project in provincial public schools, which is sponsored by the Ontario Department of Education. Dr. Higginson's co-worker, Dale Burnett, wrote a popular book on Logo.

THINK LOGO

The GAMMA Institute — a think tank jointly funded by Montreal, McGill and Concordia Universities, and Ryerson Polytechnic Institute — recently released a research paper called "On Terminals, Turtles and Turning Teaching Inside Out," which examined the impact of the personal computer on education. It concludes that researchers and educators at higher levels are very much concerned with Logo and its developments.

Elsewhere in Canada, Logo is finding strong footholds in school systems in British Columbia, Quebec, Manitoba and Saskatchewan. In Quebec, the provincial government's "Buy Quebec" policy is helping LCSI's Logo enter the schools, especially now that the company offers a version in French. In Manitoba, the Department of Education published a pamphlet for teachers called *Getting Started in Logo*, but as a beginners' guide it lacks professionalism and direction. Surprisingly, a 1983 report from the Alberta Ministry of Education on computers in the schools completely overlooked Logo in an otherwise excellent proposal. Obviously, educators still have a lot to learn.

However, through the efforts of a handful of dedicated people in a small office outside of Montreal, Logo has become an important new element in educational strategy, with Canada in the forefront of research and applications. Perhaps, someday, LCSI's dream that Logo will be available in every school and home will come true.



MERGING TRAFFIC

PILOT does it on the run

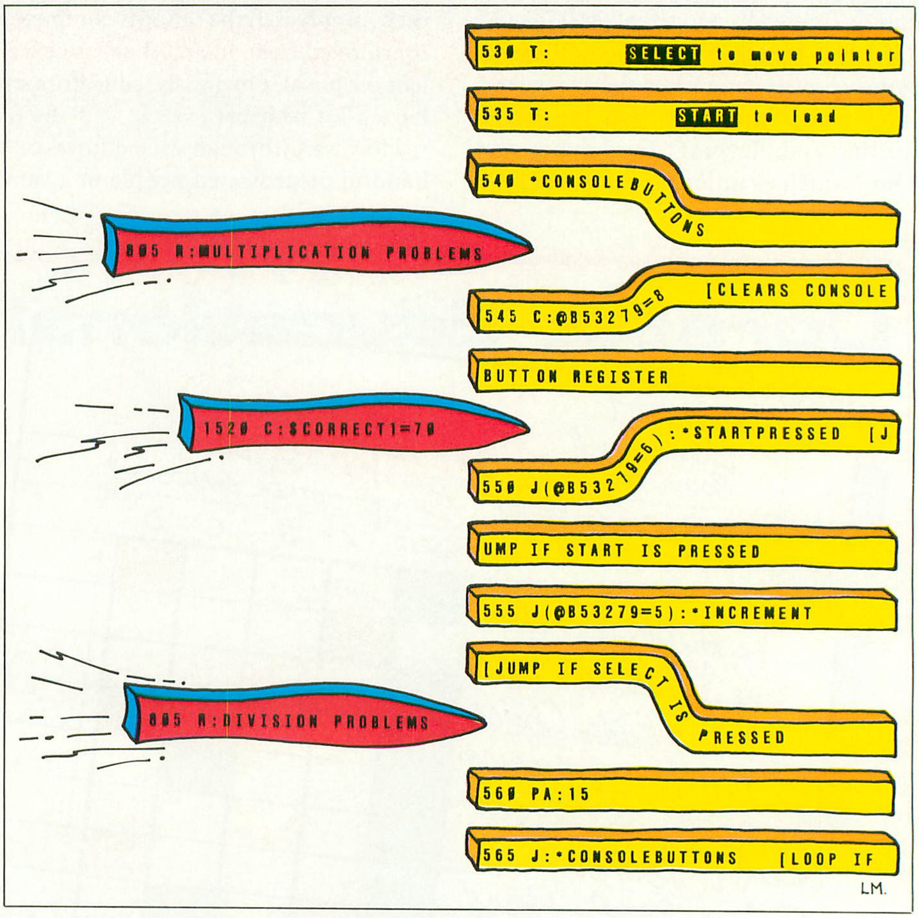
by PHIL and KATHY BERGH

MERGING IN RUN MODE? SURE!

This month's PILOT article again features Phil and Kathy Bergh and an innovative program that merges PILOT programs under program control. You can use this technique to "overlay" code and thus fit large programs into small memory spaces by LOADing only the sections of the program needed at one time. Then, when a new section is needed, you LOAD it "over" some unneeded lines.

Our PILOT/Logo columns aim to present useful procedures using features of the languages not covered in the manuals. We invite you to send ideas for articles you'd like to see, or complete articles, to me in care of this column. Just cover something new and useful.

Next month I will use Logo to make large letters (BASIC's Mode 1 and 2), and show you two safe places to put machine-language code. —Ken Harms



THE CHALLENGE: produce a useful PILOT program that teaches a technique or procedure not covered in depth elsewhere. To meet this challenge, we present a set of diskette-based, math-drill programs that show how to merge a new subprogram from diskette under program control *without erasing the current program*. We also will list the code changes necessary to use the program from cassette.

THE APPLICATION: a math-drill game with menu selection of math operation. We know that the slash mark, which Atari uses for its division computations, is not understood by younger students, so we drew upon the character set redefinition program presented in ANTIC, August 1983, to create a custom division character. We will not review the technique here. The routine that prints the traditional division sign can easily be used in math programs of your own.

MATHMERG

The main program file is titled MATHMERG. It provides the title page, custom character set, menu, screen format, and correction routines. The other four files (subprograms) contain the problems and answers that will be merged with the

main program.

The menu offers choices of addition, subtraction, multiplication, and division. When a choice is made, the name of the file holding the subprogram to be merged is written to the screen, the cursor is positioned above the LOAD statement, the computer is ordered to read the screen, and the program is E:nded. The computer is now in immediate mode and executes the LOAD command as if it were just entered from the keyboard. Because the program is not running, it avoids the automatic NEW that PILOT supplies to erase the current program before loading another file. ANTIC covered this automatic keyboard feature more fully in the Deleter program (ANTIC, "Lines Away," p. 24, July 1983).

MERGE FILES

Each of the subprograms we will merge are carefully numbered to position the T:ype statements from the small merge files to come after the POS:ition statements in the main program. Similarly, the answers come before the M:atch statements. Changing any line numbers could crash the programs. Notice that the main program has many lines that can be entered by renumbering previous lines and making small changes (such as the problem number). After you enter and save the first merge file, simply change the signs and numbers and save it again with the new name.

You can easily create your own merge files with problems suited to your needs. Change them as often as you wish without the difficulties caused by going into a large program and finding all of the lines that need modification.

A LOOK AT THE LISTING

Let's look through the listing to see how it works. The code from line 275 through 320 causes the title page to be written in large letters. For a more detailed look at how this works, see "Large Text" in *The Best of ANTIC, Vol. 1.* Remember that when you write to the screen, you must use a CLOSE:S to let the computer know you are finished. See line 440 for an example.

The lines indented with commas are part of a custom character set routine. They create a traditional division sign to replace the slash. This allows us to format division problems with one number above the other on the drill screens.

Lines 445 through 535 write the menu in large letters on a black screen and type the instructions in the text window. The routine starting at line 540 detects if the [SELECT] or [START] button has been pressed. Always C:ompute a value of eight into byte 53279 to clear it before checking to see if a console button has been pressed. This prevents re-reading a previous press. If [OPTION] is pressed, there will be a three at byte 53279. [SELECT] is a five and [START] is a six. Line 550 J:umps to *STARTPRESSED only if there is a six in byte 53279. Line 555 checks for a five. If neither [SELECT] nor [START] were pressed, we J:ump back to *CONSOLEBUTTONS to check again.

Lines 570 to 610 move the menu arrow to the next choice. The line that the arrow is on is called #L. It is incremented by two each time [SELECT] is pressed. If it is greater than seven, it is set to one again. After the arrow moves, we J:ump back to check the console buttons.

Lines 625 through 640 identify the file to be loaded according to the position of the pointer on the menu screen.

MERGING FILES

Now the fancy stuff — we merge the chosen file! We also learn something about Atari DOS and PILOT's load routines. Line 660 clears the graphics screen and prepares for normal text. We then skip down two lines on the screen and T:ype a "please wait" message. We then T:ype four blank lines. Line 690 T:ypes a LOAD command on the screen and we T:ype down two more lines. Line 696 T:ypes a J:ump command on the screen so the program will restart. Note that the J:ump command is followed by seven "up-arrows." To include an up-arrow in your program, press [ESC] and release, then press and hold [CTRL] while you push the up-arrow. You will do this seven times. When the program is run, the up-arrows will position the cursor three rows above the load command.

Line 700 forces the computer to read from the screen by C:omputing a 13 into byte 842. When the program is E:nded (line 705), the READY prompt appears. The cursor drops to the line with our LOAD command, and that line is acted upon as if it were just typed by hand on the screen.

"But how," you may ask, "does the program get running again?" Good question. The trick answer is simple. After PILOT LOADs the file T:yped by line 690, it prints a READY prompt, skips a line and positions the cursor on the line just below. And guess what? When it hits that line, it finds the command J:*TAG2 already printed there. Since the Atari is still in auto-keyboard mode, it reads the J:ump command, PILOT takes over and does the J:ump.

Why are we J:umping to *TAG2 in the merge programs? Because *TAG2 is part of our main program after we forced the LOAD. At line 780 we finish the procedure by C:omputing a 12 into byte 842. This tells the computer to stop reading from the screen.

Lines 800 through 1510 POS:ition the math problems on the screen. Lines 1640 through 2470 present and correct the problems. Remember that you can enter much of this code by changing line numbers, problem numbers, and positions. Do not forget the *space in* and *underline after* the M:atch commands, or the program will accept incorrect answers.

Finally, *CORRECT at line 2570 uses the random number generator to play a series of notes and flash the screen colors if the user gets a problem correct. *ERROR gives a two-note response to incorrect answers, and the problem is repeated.

CASSETTE VERSION

The custom character and drill screen in Math Practice can be easily used from cassette by LOADing MATHMERG from tape and then LOADing whatever problem file you wish. Many different problem sets can be accessed on different tapes. You are not limited to one file for each type of problem, as disk users

continued on next page

are, because tape files are not called by name by the program. Two disk files of the same name are, of course, not allowed.

Cassette users should replace two lines in the listing with the following:

675 T:Please insert the $PROGRAMNAME tape and press play

690 T:LOAD C:[seven up-arrows]

If you do not want the LOAD commands that appear in the text window to be visible, then add:

676 C:@B709=5
781 C:@B709=10

Line 676 changes the luminance of the text to match the background, thus rendering it invisible. The second line restores the color values.

The youngsters who tested this program found it "more fun than flashcards." The adults found other ways to utilize some of these ideas. We hope you, too, will find it instructive and enjoyable.

Listing 1

```
195 *BEGIN
200 ,     C:#Z=@176/1024+3
205 ,     C:#Z=#Z*1024
210 ,     C:#Y=@B756*256
215 ,     C:@B756=#Z/256
220 ,     C:#W=#Z
225 R:#Y POINTS TO ORIGINAL CHARACTER
SET
230 R:#Z POINTS TO NEW RAM CHARACTER S
ET
235 R:#W IS ALSO THE ADDRESS OF THE NE
W CHARACTER SET
240 R:*******************************
245 R: PROGRAM DESIGNED FOR MERGING
250 R: WITH OTHER PROGRAMS - DO NOT
255 R:CHANGE THE LISTED LINE NUMBERS
260 R:*******************************
265 C:#M=0   [#M INITIALIZATION
270 C:#L=1   [#L IS THE MENU LINE THE P
OINTER IS ON
275 C:@B1373=16 [USE SPLIT SCREEN
280 C:@B1374=2  [USE LARGE CHARACTERS
285 POS:3,3
290 WRITE:S,
295 ,     C:@B756=#W/256
300 POS:3,3
305 WRITE:S,MATH PRACTICE
310 POS:3,6
315 WRITE:S, [+] [-] [*] [/]
320 R:By Kathy and Phil Bergh
325 PA:40
330 ,     C:#X=0
335 *MOVEIT C:@B#Z=@B#Y [PART OF CHARA
CTER SET PROGRAM
340 ,     C:#Y=#Y+1
345 ,     C:#Z=#Z+1
350 ,     C:#X=#X+1
355 ,     J(#X<1024):*MOVEIT
360 ,     C:#W=#W+120
365 ,     C:@B#W=0
370 ,     C:#W=#W+1
375 ,     C:@B#W=24
380 ,     C:#W=#W+1
385 ,     C:@B#W=0
390 ,     C:#W=#W+1
395 ,     C:@B#W=126
400 ,     C:#W=#W+1
405 ,     C:@B#W=0
410 ,     C:#W=#W+1
415 ,     C:@B#W=24
420 ,     C:#W=#W+1
425 ,     C:@B#W=0
430 ,     C:#W=#W+1
435 ,     C:@B#W=0
440 CLOSE:S
445 *START
450 POS:3,2
455 C:@B1373=16 [USE SPLIT SCREEN
460 C:@B1374=2  [USE LARGE CHARACTERS
465 WRITE:S,[CLEAR]
470 ,     C:@B756=#W/256
475 POS:3,1
480 WRITE:S,[+] ADDITION
485 POS:3,3
490 WRITE:S,[-] SUBTRACTION
495 POS:3,5
500 WRITE:S,[X] MULTIPLICATION
505 POS:3,7
510 WRITE:S,[/] DIVISION
515 POS:1,#L
520 WRITE:S,>
525 T:
530 T:            [SELECT] to move pointer
535 T:              [START] to load
540 *CONSOLEBUTTONS
545 C:@B53279=8     [CLEARS CONSOLE BUTT
ON REGISTER
550 J(@B53279=6):*STARTPRESSED  [JUMP
IF START IS PRESSED
555 J(@B53279=5):*INCREMENT  [JUMP IF
SELECT IS PRESSED
560 PA:15
565 J:*CONSOLEBUTTONS     [LOOP IF NO BU
TTON WAS PRESSED
570 *INCREMENT  [MOVE POINTER ARROW, L
OCATION KEPT AS #L
575 POS:1,#L
580 WRITE:S,_
585 C:#L=#L+2
590 C(#L>7):#L=1
595 POS:1,#L
600 WRITE:S,>
605 PA:15
610 J:*CONSOLEBUTTONS
```

```
615 *STARTPRESSED
620 CLOSE:S
625 C(#L=1):$PROGRAMNAME=ADD
630 C(#L=3):$PROGRAMNAME=SUBTRACT
635 C(#L=5):$PROGRAMNAME=MULTIPLY
640 C(#L=7):$PROGRAMNAME=DIVIDE
645 *MERGEIT
650 J(#L=#M):*TAG2
655 C:#M=#L [DUMMY VALUE TO CHECK TO P
REVENT LOADING THE SAME FILE THAT IS C
URRENTLY IN MEMORY
660 GR:QUIT
665 T:
670 T:
675 T:PLEASE WAIT WHILE I LOAD $PROGRA
MNAME
680 T:
682 T:
684 T:
686 T:
690 T:LOAD D:$PROGRAMNAME
692 T:
694 T:
696 T:J:*TAG2↑↑↑↑↑↑↑
700 C:@B842=13 [FORCES COMPUTER TO REA
D FROM SCREEN
705 E:
770 *TAG2
780 C:@B842=12 [FORCES COMPUTER TO WRI
TE TO SCREEN
790 GR:QUIT
795 C:@B756=#W/256
```

```
800 POS:4,2
820 POS:3,3
840 POS:3,4
850 T:▬▬▬
860 POS:14,2
880 POS:13,3
900 POS:13,4
910 T:▬▬▬
920 POS:24,2
940 POS:23,3
960 POS:23,4
970 T:▬▬▬
980 POS:34,2
1000 POS:33,3
1020 POS:33,4
1030 T:▬▬▬
1040 POS:4,9
1060 POS:3,10
1080 POS:3,11
1090 T:▬▬▬
1100 POS:14,9
1120 POS:13,10
1140 POS:13,11
1150 T:▬▬▬
1160 POS:24,9
1180 POS:23,10
1200 POS:23,11
1210 T:▬▬▬
1220 POS:34,9
1240 POS:33,10
1260 POS:33,11
1270 T:▬▬▬
1280 POS:4,16
1300 POS:3,17
1320 POS:3,18
1330 T:▬▬▬
1340 POS:14,16
1360 POS:13,17
1380 POS:13,18
1390 T:▬▬▬
1400 POS:24,16
1420 POS:23,17
1440 POS:23,18
1450 T:▬▬▬
1460 POS:34,16
1480 POS:33,17
1500 POS:33,18
1510 T:▬▬▬
1640 *PROBLEM1
1650 POS:4,5
1660 A:$ANSWER1
1670 M: $CORRECT1_
1680 UY:*CORRECT
1690 UN:*ERROR
1700 JN:*PROBLEM1
1710 *PROBLEM2
1720 POS:14,5
1730 A:$ANSWER2
1740 M: $CORRECT2_
1750 UY:*CORRECT
1760 UN:*ERROR
1770 JN:*PROBLEM2
1780 *PROBLEM3
1790 POS:24,5
1800 A:$ANSWER3
1810 M: $CORRECT3_
1820 UY:*CORRECT
1830 UN:*ERROR
1840 JN:*PROBLEM3
1850 *PROBLEM4
1860 POS:34,5
1870 A:$ANSWER4
1880 M: $CORRECT4_
1890 UY:*CORRECT
1900 UN:*ERROR
1910 JN:*PROBLEM4
1920 *PROBLEM5
1930 POS: 4,12
1940 A:$ANSWER5
1950 M: $CORRECT5_
1960 UY:*CORRECT
1970 UN:*ERROR
1980 JN:*PROBLEM5
1990 *PROBLEM6
2000 POS:14,12
2010 A:$ANSWER6
2020 M: $CORRECT6_
2030 UY:*CORRECT
2040 UN:*ERROR
2050 JN:*PROBLEM6
2060 *PROBLEM7
2070 POS:24,12
2080 A:$ANSWER7
2090 M: $CORRECT7_
2100 UY:*CORRECT
2110 UN:*ERROR
2120 JN:*PROBLEM7
2130 *PROBLEM8
2140 POS:34,12
2150 A:$ANSWER8
2160 M: $CORRECT8_
2170 UY:*CORRECT
2180 UN:*ERROR
2190 JN:*PROBLEM8
2200 *PROBLEM9
2210 POS: 4,19
2220 A:$ANSWER9
2230 M: $CORRECT9_
2240 UY:*CORRECT
2250 UN:*ERROR
2260 JN:*PROBLEM9
2270 *PROBLEM10
2280 POS:14,19
2290 A:$ANSWER10
2300 M: $CORRECT10_
2310 UY:*CORRECT
```

continued on next page

```
2320 UN:*ERROR
2330 JN:*PROBLEM10
2340 *PROBLEM11
2350 POS:24,19
2360 A:$ANSWER11
2370 M: $CORRECT11_
2380 UY:*CORRECT
2390 UN:*ERROR
2400 JN:*PROBLEM11
2410 *PROBLEM12
2420 POS:34,19
2430 A:$ANSWER12
2440 M: $CORRECT12_
2450 UY:*CORRECT
2460 UN:*ERROR
2470 JN:*PROBLEM12
2480 POS:2,21
2490 T:Would you like to try these pro
blems again or try another skill? Type
 AGAIN, ANOTHER, or QUIT \
2500 A:$AGAIN
2510 M: AGAIN , ANOTHER , QUIT_
2520 JM:*TAG2,*START,*QUIT
2530 *QUIT
2540 T:⇱
2550 T:Thanks for playing.  See you ag
ain soon.
2560 E:
2570 *CORRECT
2580 C:#X=0
2590 *ANOTHERNOTE
2600 C:#J=?\8
2610 SO(#J=0):13
2620 C(#J=0):@B710=6
2630 SO(#J=1):15
2640 C(#J=1):@B710=14
2650 SO(#J=2):17
2660 C(#J=2):@B710=196
2670 SO(#J=3):18
2680 C(#J=3):@B710=100
2690 SO(#J=4):20
2700 C(#J=4):@B710=56
2710 SO(#J=5):22
2720 C(#J=5):@B710=148
2730 SO(#J=6):24
2740 C(#J=6):@B710=70
2750 SO(#J=7):25
2760 C(#J=7):@B710=26
2770 PA:?\2*4
2780 C:#X=#X+1
2790 J(#X<12):*ANOTHERNOTE
2800 PA:32
2810 SO:0
2820 C:@B710=148
2830 E:
2840 *ERROR
2850 SO:12
2860 PA:4
2870 SO:1
2880 PA:8
2890 SO:0
2900 E:
```

Listing 2

```
805 R:ADDITION PROBLEMS -- save in dis
k file named ADD or on separate tape.
810 T:10  [ADDITION PROBLEMS TO MERGE
830 T:+17 [WITH MAIN PROGRAM
870 T: 8
890 T:+ 4
930 T:15
950 T:+ 5
990 T:17
1010 T:+13
1050 T: 5
1070 T:+ 9
1110 T:24
1130 T:+18
1170 T:13
1190 T:+10
1230 T:15
1250 T:+11
1290 T:25
1310 T:+ 8
1350 T:11
1370 T:+19
1410 T: 9
1430 T:+ 6
1470 T:12
1490 T:+ 9
1520 C:$CORRECT1=27
1530 C:$CORRECT2=12
1540 C:$CORRECT3=20
1550 C:$CORRECT4=30
1560 C:$CORRECT5=14
1570 C:$CORRECT6=42
1580 C:$CORRECT7=23
1590 C:$CORRECT8=26
1600 C:$CORRECT9=33
1610 C:$CORRECT10=30
1620 C:$CORRECT11=15
1630 C:$CORRECT12=21
```

Listing 3

```
805 R:SUBTRACTION PROBLEMS -- save in
disk file named SUBTRACT or on separat
e tape.
810 T:10  [SUBTRACTION PROBLEMS TO
830 T:- 7 [MERGE WITH MAIN PROGRAM
870 T: 8
890 T:- 4
930 T:15
950 T:- 5
990 T:17
1010 T:- 3
1050 T:25
1070 T:- 9
1110 T:24
```

```
1130 T:-13
1170 T:13
1190 T:-10
1230 T:15
1250 T:-11
1290 T:25
1310 T:-11
1350 T:29
1370 T:-19
1410 T: 9
1430 T:- 6
1470 T:12
1490 T:- 6
1520 C:$CORRECT1=3
1530 C:$CORRECT2=4
1540 C:$CORRECT3=10
1550 C:$CORRECT4=14
1560 C:$CORRECT5=16
1570 C:$CORRECT6=11
1580 C:$CORRECT7=3
1590 C:$CORRECT8=4
1600 C:$CORRECT9=14
1610 C:$CORRECT10=10
1620 C:$CORRECT11=3
1630 C:$CORRECT12=6
```

Listing 4

```
805 R:MULTIPLICATION PROBLEMS -- save
in disk file named MULTIPLY or on sepa
rate tape.
810 T:10  [MULTIPLICATION PROBLEMS TO
830 T:X 7 [MERGE WITH MAIN PROGRAM
870 T: 8
890 T:X 4
930 T: 5
950 T:X 5
990 T: 7
1010 T:X 3
1050 T: 3
1070 T:X 9
1110 T:12
1130 T:X 3
1170 T:11
1190 T:X 5
1230 T: 6
1250 T:X 8
1290 T: 7
1310 T:X 8
1350 T: 9
1370 T:X 9
1410 T:11
1430 T:X 6
1470 T:12
1490 T:X 5
1520 C:$CORRECT1=70
1530 C:$CORRECT2=32
1540 C:$CORRECT3=25
1550 C:$CORRECT4=21
1560 C:$CORRECT5=27
1570 C:$CORRECT6=36
1580 C:$CORRECT7=55
1590 C:$CORRECT8=48
1600 C:$CORRECT9=56
1610 C:$CORRECT10=81
1620 C:$CORRECT11=66
1630 C:$CORRECT12=60
```

Listing 5

```
805 R:DIVISION PROBLEMS -- save in dis
k file named DIVIDE or on separate tap
e.
810 T:10  [DIVISION PROBLEMS TO MERGE
830 T:/ 2 [WITH MAIN PROGRAM
870 T: 8
890 T:/ 4
930 T:15
950 T:/ 5
990 T:42
1010 T:/ 6
1050 T:77
1070 T:/11
1110 T:24
1130 T:/ 8
1170 T:35
1190 T:/ 7
1230 T:56
1250 T:/ 8
1290 T:25
1310 T:/ 5
1350 T:28
1370 T:/ 4
1410 T:48
1430 T:/ 6
1470 T:64
1490 T:/ 8
1520 C:$CORRECT1=5
1530 C:$CORRECT2=2
1540 C:$CORRECT3=3
1550 C:$CORRECT4=7
1560 C:$CORRECT5=7
1570 C:$CORRECT6=3
1580 C:$CORRECT7=5
1590 C:$CORRECT8=7
1600 C:$CORRECT9=5
1610 C:$CORRECT10=7
1620 C:$CORRECT11=8
1630 C:$CORRECT12=8
```

EXCLUSIVE ANTIC INTERVIEW

JAMES MORGAN

Atari Chairman and C.E.O.

by JAMES CAPPARELL
ANTIC Publisher



The year 1983 was a dramatic one for Atari, Inc. After a meteoric rise through the late 1970's, interest in video gaming peaked and began to plummet. The growth of the company, once fueled by seemingly endless profits, soared beyond the support of sales. Quarterly losses of many millions of dollars began to be posted.

Atari had to economize. Assembly line workers were laid off and computer manufacturing was moved to Hong Kong. The crisis deepened, and white collar workers, too, began to feel the pinch. In one year, Atari cut its workforce almost in half, and it is still pruning selected branches from its organizational tree.

In the late summer of 1983, Warner Communications, Atari's parent corporation, announced that Atari Chairman Raymond Kassar would step down, and be replaced by James J. Morgan, 41, then a vice president of Philip Morris, Inc.

Morgan, a Princeton graduate (*cum laude* in American history), had worked for Philip Morris all of his professional life. He joined that company in 1963 in the advertising department, and rose steadily through the marketing ranks. Parliament, Virginia Slims and Marlboro cigarettes have all been products under his direct management.

Last September, James Morgan arrived at Atari to take over as Chairman and Chief Executive Officer. His job, clearly, is to turn the company around, to chart the proper course in an industry that doesn't seem to know where it is going. His position is enviable, he says, because Atari's woes were caused by others, and he has no ego investment in past decisions. But the judgment of the future will be upon him soon enough.

Can a marketing manager from the East with a liberal arts background successfully guide this promising but troubled western computer company? Our interest is more than casual. The following interview was conducted last Thanksgiving by ANTIC Publisher James Capparell in Morgan's Sunnyvale office.

Antic: At the Consumer Electronics Show in January, 1984, will you be showing any new products?

Morgan: First of all, let me tell you that Atari will introduce new products in 1984. However, you won't see them at this CES because we are not yet ready to ship those products.

For your background, Atari has decided as a matter of policy that we will not show new products anywhere unless

we can ship them almost immediately. This industry, including Atari, has shown products in the past and then delayed shipments or cancelled the products altogether. That operating style does not build credibility with retailers, with customers, or with the media, so Atari won't have any part of it.

Antic: What is your view of the current state of affairs at Atari?

Morgan: I see Atari as a company that has bottomed out, that is on its way back. It is on its way back in two respects: 1) sales are improving, 2) its ability to run its business in an intelligent manner is improving. Therefore, as Atari repositions itself in the home computer and video game businesses, it will do so as a much better-run company than before. The excesses of the past are getting purged out of the organization.

Antic: What are the excesses? Or what *were* the excesses?

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"For someone to walk out of this industry now would be crazy. What it takes is imagination and guts."

Morgan: Spending. Atari spent money loosely, in a way that demonstrated that Atari felt that it could be everything to everybody, rather than be a well-focused company.

Antic: You've had the reins now since September of 1983. If you were to state the positive actions *you've* taken to correct what's happened in the past, what would you say they are?

Morgan: We are focusing on product strategy, making certain that we define what we do with our products. Also, we are getting a very talented and capable group of managers to work together, as opposed to merely existing in somewhat isolated surroundings with no coordination or communication. Third, we are applying tighter standards on how we spend our money and we're making sure that the dollars we spend relate more closely to making our products better. On top of that, we're investing reasonably in the future within a defined strategic arena.

Antic: I'm glad you mentioned the future. What do you see as the future of Atari? And what is Atari's commitment to computing and computer products?

Morgan: Without a doubt, Atari is in the computer business to stay. There's no reason for us not to be. In my judgment, the home computer companies have not treated the consumers with the respect and consideration they deserve. The real issue is this: Which company will be the first to go to the American consumer with microprocessor technology that makes the consumer say, "Gee, I didn't know a computer could do that," and secondly, "I have to have one." So far (other than word processing, perhaps), the computers offered to the public really do not do anything much easier than you can do by hand.

This industry is very challenging, and for someone to walk out of it right now, I think, would be crazy. The opportunity is too great. What it takes is imagination and guts.

"The products I'm talking about go well beyond the present in imagination, usefulness, excitement, and compelling relevance to the consumer's everyday life."

Antic: Do you see a real need for a computer in the home, or for people to be computer literate?

Morgan: Well, if you want to do computation, a calculator is easier than a computer. If you want to type a letter, I suppose even today a typewriter is easier than a computer. Again, the balance of the responsibility shifts to the manufacturer to provide consumers with a machine, a vehicle or a device, which either makes life more entertaining, assists learning, makes life more efficient, or in some other way enhances life.

To date, I don't believe anybody has really addressed that issue satisfactorily in terms of the home. Clearly, for the office there are superb pieces of equipment which accomplish great tasks, but in a home environment I'm not at all sure that anybody has come forth with the ultimate product, or anything that's even close to being the ultimate product. We, at Atari, are committed to that task.

Antic: Prior to your coming to Atari, had you brought a computer into your home?

Morgan: I had not purchased a home computer because I couldn't answer the question, "What will this do for me?" I had decided that there was really nothing that it could do for me, other than word processing. Since I'm a businessman and have a secretary, I don't really need word processing capability in the home.

"The XL series is at least two years ahead of what the consumer is aware a computer can do."

As a parent, I might justify it on the basis that I would be terrified that my children would be left behind in society by not being computer literate. But that's not really an appropriate way to sell your product, nor is it an appropriate consideration from a consumer standpoint.

Antic: What's Atari doing about it?

Morgan: We are focusing a substantial part of our resources on that issue. I believe that the computer keyboard is already an outdated and archaic device. Other than word processing, you don't really need it for anything. There have to be more appropriate and imaginative ways for the user to interface with this piece of equipment.

Antic: Can you name some?

Morgan: Well, clearly voice recognition is one. And beyond that there are various devices such as light pens, mice and other vehicles, but I'm hopeful that Atari will come up with other really unique ways.

Antic: Let's change the subject for a moment. Atari started as the premier company in video games and still has that image, somewhat — do you see the video game industry as having peaked?

Morgan: No, not at all. I see the video game industry going through the same kinds of phases that other forms of entertainment go through from time to time. You know, we not only compete with the other video game companies; we also compete against movies, we compete against television, we compete against roller skating rinks, we compete against miniature golf courses, we compete against magazines and novels. What we compete for is our share of the six hours a day that the consumer does not work or sleep.

Unless your product is constantly at an entertainment crescendo, you tend to fall behind other forms of entertainment in terms of being exciting and new and different . . . something that people would want to spend one or two hours a day with. I believe that the video game industry has tremendous opportunity to rekindle the kind of involvement and excitement it had in its early days.

Antic: That's an interesting concept.

Morgan: Let's take it one step further. You know, in the middle 1970's the movies were said to be on their last legs, and then "Star Wars" came along. Not only was "Star Wars" exciting as an individual movie, but it rekindled the American consumer's belief that it was

appropriate to spend two to four hours a week at the movies, and all movies benefitted from it.

The same thing has happened in the record business, where all people could talk about was piracy and how records were on their way out. Then MTV came along as a new, creative medium by which people could listen to records. Now, record sales are booming because American teenagers have been reconditioned to spend time listening to music.

I believe that an analogy exists for the video game industry, and Atari has a rightful role, almost a birthright, to be the company that goes to the American public with the next generation of games.

Antic: What are the reasons, as you perceive them, that people have purchased computers to date?

Morgan: Number one is fear of not having one. Number two is the novelty. Number three is that manufacturers have sold them at such palatable prices that you can hardly afford not to experiment with one. In some cases, the cost didn't represent much more of an investment than going out and getting a really terrific jar of wax for your car.

Those reasons are transitory, though. Those are not permanent reasons why an industry should survive. I believe that it is incumbent on manufacturers to find real, tangible reasons why someone should consider a computer. Everybody talks about why someone should own one. I don't care about why people should own a computer; I care about why they should *use* it.

"Atari tries to enhance people's home lives through interactive electronics."

Antic: Would you describe Atari as a recreation-oriented company?

Morgan: I would say that Atari is a company that tries to enhance people's home lives through interactive electronics. That enhancement can take the form of straight entertainment, learning, or functional ease. In any event, that's my idea of Atari's business arena.

Antic: I know that Atari has spent a lot of money on R&D, but I don't think that's been publicized — to our readers, especially. Atari has hired some engineers and scientists who are excellent. Can you tell us anything about what they are doing, what they're up to?

Morgan: First of all, you're right about the high calibre of our R&D staff. The R&D group is headed by Dr. Ted Hoff, who invented the microprocessor that has made the home computer and video game industries a reality. Our chief scientist is Dr. Alan Kay, who is generally considered the father of the home computer.

Now, let me tell you about my philosophy on research and development. I believe that for every hundred dollars you spend on R&D, eighty of that hundred ought to be focused on your business, and the other twenty you spend as your top research people see fit. Good research people need the flexibility to chase down any idea, any scheme, even though only one out of ten or twenty of those ideas actually leads to a product.

I'll tell you why we devote eighty out of every hundred dollars of R&D money to products related directly to our business. I believe it is important to understand that Atari exists at the will of the consumer. It's absolutely nonproductive to sell something just because you can make it, as opposed to selling something because someone wants it.

So, this research group, which is composed of absolutely outstanding individuals, is being refocused to look more closely at the consumer's wants and needs, not just at what technology can produce. The consumer is king, and no one understands that better than we do at Atari.

Antic: Is the games image something that hurts the company, do you feel?

Morgan: I believe that people have a built-in preconception of Atari as a games company. That, on one hand, hurts us a little in the computer business because we're not taken terribly seriously, even though our computers are superior products that don't get the credit they deserve. On the other hand, if you're viewed as being excellent in something, it should have a positive impact on other parts of your business.

I believe that the Alan Alda commercials will be exceptionally valuable to this company in terms of having people come to understand that we *are* committed to the computer business, that we're committed to it in a way that's oriented toward the consumer. The products we come to the marketplace with will be consumer-related products that focus on doing something positive for the consumer.

Antic: Like word processing or home tax or . . .

Morgan: Way beyond that. That's what I call standard stuff. That's taking numbers and words and rearranging them. That certainly has a place. But the kind of products I'm talking about go well beyond that in terms of imagination and creativity, usefulness, excitement, and really compelling relevance to the consumer's everyday life.

Antic: We've spoken about the game image, whether it's good or bad, but we haven't really used the term "education" at all. Do you see education as being a subset of, say, recreation or games?

Morgan: I don't like the word "education." I believe "education" stands for institution, which stands for mass curriculum. I prefer the word "learning." And I think Atari has an enormous role to play in the learning area. I question the degree to which Atari belongs in the big institutional education area. First of all, it's not an area where one can make a large profit. And secondly, the business procedures one finds in the institutional market are not terribly inviting. So I believe that what Atari has to do is stay extremely prominent in the learning area, and deal directly with the consumer in that area.

Antic: Prominent in the learning area in the home?

Morgan: Just in the learning area. Focused straight to the consumer.

Antic: That's an interesting distinction. Lots of people are throwing around the word "education."

Morgan: Education is what's done *to*

continued on next page

you. Learning is what you do for yourself. There is, in my mind, a very big difference between the two.

Antic: Off the subject a little bit — what are your thoughts about software standardization, compatibility problems, etc.? Do you have any?

Morgan: I have two thoughts, and they're somewhat conflicting. On one hand, I think that people have to be pragmatists and realize that neither the consumer nor the distribution system will be able to support a multiplicity of noncompatible software lines. That issue has to be addressed, it has to be reconciled, and today's popular wisdom has it that IBM will be setting the standards for that.

On the other hand, if one accepts my belief that nobody has gone to the consumer yet with a really compelling presentation, I would suggest to you that software compatibility is not that important. Because software compatibility assumes that the computer of the future will be the computer of today, i.e., a central processing unit where you just pump in your software and it runs it.

I'm not so sure I agree with that definition of what the computer of the future is going to be. I'm not sure that the computer of the future will in fact be a CPU off which everything's driven. It might well be, on the other hand, a series of semi-dedicated microprocessors which do specific tasks.

Now, let's say someone has a robot that can vacuum your house by starting at one corner, and it has sensors so it can get around and clean your entire house in an hour. If that's what its function is, it hardly matters whether that software is compatible or not; the vacuum is its own unit.

Antic: Do I hear you saying, between the lines, that Atari will attempt to identify the consumer market, address itself to that, and produce products that will, in fact, become a new standard, IBM notwithstanding.

Morgan: Standard might be too big a word. It might be the standard of what it does, but it might not do everything one wants. In order to do everything one wants, you might have to buy a series of products which cumulatively, or in aggregate, become the standard.

Antic: Have you thought about any nicknames for these products? I've often thought that as long as we called them "computer," we were stuck.

Morgan: Oh, I believe that. In fact, I think of them as microprocessors. The critical issue in this business is: how does one take microprocessor technology and make it relevant to the consumer?

In the short term, we are selling every computer we can make. We cannot deliver all our orders, and I think that's because there is incredible recognition of the quality of the Atari computers. The Atari 800 might be, pound for pound, dollar for dollar, the best computer that's ever been built in this country. While the general public's not aware of that, there is great recognition regarding the quality of that computer.

"It's absolutely nonproductive to sell something just because you can make it, as opposed to selling something because someone wants it."

Antic: And that's after three years, three and a half years; it still maintains that. What about the XL line of computers?

Morgan: The XL series is at least two to three years ahead of what the average consumer is even aware that a computer can do. So it seems to me somewhat foolhardy to invest in "normal upgrades" of equipment, especially if you sincerely believe that the answer for the future is not necessarily another CPU with another keyboard and more memory.

I would rather take our resources and go further out and try to find for the computer or the microprocessor that same niche and that same quality that the Video Computer System (VCS) had when it was introduced in mid-1977.

When the VCS was introduced people sort of said, "What's this strange little machine?" It was way ahead of its time; then it caught on, and all of a sudden everybody wanted one. I believe you can do the same thing with computers, and hopefully, sometime in 1985 or early 1986, Atari will come to the market with a product that people will have trouble figuring out. Is it a computer, or what? It will be there, and it will sell in limited quantities to a number of people who have the imagination to see what it's all about. Then, as time goes on, the market will come to *it* because Atari will have correctly forecasted what the microprocessor technology of the late 1980's is going to be like.

"The Atari 800 might be, pound for pound and dollar for dollar, the best computer that's ever been made."

Antic: You're obviously not leaving the computer business and kissing your position good-bye. Atari has an excellent name.

Morgan: Well, having suffered all the pain, why would one pull away when the rest of the competition is abating? The level of competition is substantially less than it was six months ago, and less than it was a year ago.

Antic: What are your priorities at Atari?

Morgan: One, is to make a profit for the stockholders of Warner Communications. And number two is to do that by providing reliable, high quality, imaginative products to our customers.

Antic: What's the biggest problem you see affecting Atari's future?

Morgan: I would say the biggest problem is demonstrating in a reasonable time that the company is a healthy company; I'd like to stop all the funerals that are being held for it. Those funerals tend to upset Atari employees, upset Atari customers, upset Atari retailers. It makes life just that much more difficult. I would say that's the single biggest problem. At Atari, we're focusing our sights on the future.

Antic: We are just waiting for Atari to do what we've always expected it to do,

on the product side.

Morgan: This company is poised to be a reliable creator and manufacturer of products that the consumer wants. That's the only essential question that faces this company. I believe that there's no reason why this company can't do that. It has the people to do it, it has the products to do it, and it also has the track record.

Its problems were not its products. Its problems were the strategies of its products, the timing of its products, and the way the products were marketed. It was not the technology of the products. Atari makes superb products.

Antic: What does Jim Morgan say about himself? Do you feel that you are getting up to speed personally and professionally in high-tech Silicon Valley? Does this environment feel good to you?

Morgan: I'm the last person who should answer that. But, there is one thing I'd like to say, which is that the image of a high-tech, high-speed, incredibly complicated Silicon Valley is a vastly exaggerated phenomenon. While it's true that this is an industrious area — hard-working and fast-paced — the business issues that one deals with, are *not* special to this industry. The business issues in this industry are as common as they are in many other industries, and in that sense I've been surprised because there was so much hullabaloo about Silicon Valley and the high-tech business.

I think it's important to remember that Atari's not a defense contractor, nor is Atari an industrial, high-tech company. Atari is a consumer products company, and the same consumer who decides what kind of frozen vegetables he's going to buy, what kind of beer he's going to buy, and what kind of car he's going to buy, what kind of airline he's going to fly, is the same consumer making decisions on Atari products.

In fact, one of my major criticisms of this company and this industry in the past has been that it has moved too fast and been too much in love with the speed of getting things to market without paying enough attention to the strategy of the products that it's brought to market. Speed for speed's sake can be a very damaging thing, particularly when you remember it's the consumer who's making the ultimate decision.

Antic: If you wanted to leave Atari computer owners with a thought, what would it be, about the company and about its prospects for the future?

Morgan: Quite simply that Atari's in computer business, and it intends to stay in the business. Our commitment is to continue to build computers and/or semi-dedicated microprocessors of the highest quality with the greatest relevance to their everyday lives. And that if we can do that and satisfy *them*, then there is nothing but bright days ahead for both Atari and for our consumers.

"Atari is in the computer business to stay."

THE IMPORTED ATARI

Points for purchase north of the border

by WARWICK WAKEMAN

Caveat emptor ("let the buyer beware") is the most reasonable guideline for Canadian consumers who import computer wares from the United States (or "across the line" as we Canadians say). Considerable caution is called for, because consumer protection laws and customer services don't necessarily apply in international deals. Even so, many Canadian buyers still choose to bypass local outlets in favor of purchasing computer equipment in the U.S. The primary reasons for this are clear: lower prices and greater product availability.

THE GIANT TO THE SOUTH

There is no question that, even with the addition of customs duties, applicable taxes, and shipping costs, some computer goods can still be purchased by Canadians at great savings outside of Canada. In the giant U.S. marketplace, for example, discount-house competition, price wars and bargain-basement sales combine to force prices down. In Canada, on the other hand, relatively primitive marketing practices and a lack of competition (Atari has only one distributor here) keep prices high.

Warwick Wakeman, a freelance writer who covers the computer field, lives in North Vancouver, British Columbia. Besides being our Canadian connection, he helped coordinate international input into our international issue.

THE BANES OF CANADIAN COMPUTERISTS

Another factor that contributes to higher prices is Canada's status as a bilingual country. Under certain circumstances, information in both French and English must appear on product labels. The expense of double labelling discourages some U.S. manufacturers and Canadian importers from serving this market.

Availability is another element that prompts Canadians to investigate "non-commercial" importing. The size of a market dictates both product variety and quantity, and if the home market (as in Canada's case) is relatively small and the demand for particular items (such as Atari computers) is relatively low, the consumer with special needs may be forced to buy elsewhere. In addition, new products sometimes appear on the U.S. scene months before reaching Canadian markets — a merchandising idiosyncrasy that Atari and other manufacturers would do well to address.

AMATEUR IMPORTING

Amateur importers must solve many new and interesting problems if they are to successfully import products that suit their needs and pocketbooks. The primary considerations at this point are the added costs of importation, the availability of after-sales service and the guarantee of at least some degree of consumer protection. Let's look at these important issues one at a time.

To determine the actual cost of importing goods from the

United States into Canada, you must examine the following: the U.S. price, currency exchange rates between the two countries, duties, Federal sales taxes, excise taxes (if any) and shipping costs. Table 1 focuses on an Atari 1025 printer; it should be used only as a general guide and is not intended to show all the actual costs involved.

Table 1
Cost of importing an Atari 1025

U.S. price	$399
Canadian equivalent (+23%)	491
Duty ($491 @ 3.9%)	19
Total duty-paid value	510
Federal sales tax ($510 @ 9%)	46
Subtotal	556
Excise tax	0
Cost before shipping	556
Shipping (United Parcel Service)	34
Landed cost in Canadian funds	$590

You can reduce your shipping costs somewhat if you actually travel across the border and bring back the goods yourself. Vacationers, for example, can often qualify for exemptions, depending on the length of time they are out of the country. Check with Customs before you travel. It is a good idea to obtain information about exemptions and entry numbers for your intended purchases before you make the trip (see examples in Table 2). This will save you time and inconvenience when you return.

Table 2
Canadian customs information

Item	Duty Rate (1)	Sales Tax	Entry Number
CPU's	3.9%	9%	41417-1
Monitors	3.9%	9%	41417-1
Disk drives	Free	9%	41417-2
Printers	Free	9%	41417-2
Modems	12.9%	9%	44506-1
Software (disk)	Free (2)	9% (2)	41417-2
Software (tape)	3.9% (2)	9% (2)	41417-1

(1) These rates apply as of January 1, 1984.

(2) Software falls into two categories. "Application" software is liable for duty and sales tax on the cost of the tape or disk alone; for "operations" or "systems" software, the total cost of the software is liable. Check with Customs for details before you buy.

DON'T CHEAT!

A word of warning: Don't be tempted to cheat! If you do not declare goods that you are bringing into the country or if you make a false declaration, you are subject to a number of unpleasant consequences, not the least of which is the possible seizure and forfeiture of the vehicle you use to transport the goods. The least that you can expect is to pay extra duty on the goods, and to have your name placed on file for future reference. The technical term for this offense: smuggling.

SERVICE?

What happens if your imported Atari hardware needs service? First of all, the warranty is not valid in Canada and your local Atari service center will not repair it unless you're willing to pay the going labor rate ($50 an hour) and pay for the required parts. Sending it back to the seller for repair is also far from an ideal answer to the problem, as it is often both inconvenient and costly. You are liable for shipping charges, and you may also have to pay additional customs charges or taxes. Check with the Remission Section of Canada Customs before making a move.

To forestall such a dilemma, remember to test the unit you are purchasing beforehand if you are physically present at the point of purchase. It can't hurt.

CAVEAT EMPTOR

A popular misconception holds that a seller is obliged by law to accept the return of an item by a dissatisfied customer for any reason — or for no reason at all. However, no such obligation exists unless it is specifically agreed to by both buyer and seller in a contract. The merchant does have a legal obligation to abide by his advertised claims and to honor the sales terms he's agreed to.

OTHER OPTIONS

This doesn't guarantee customer satisfaction, of course, but in the vast majority of cases these guidelines work fairly well. And, fortunately, other avenues of help are also available to those customers who are unable to get a satisfactory response from a foreign dealer.

Contacting your local Better Business Bureau is probably your best first bet after you've given up hope of gaining satisfaction directly from the dealer. They'll investigate the situation through their office in (or closest to) the seller's area. Another possible route is to contact the Chamber of Commerce, but in this case you'll have to contact the branch in the seller's city (its Canadian counterpart will not get involved in consumer complaints). A third recourse is to write the consumer department of the relevant state. About 40 U.S. states have such departments, but the services they provide may vary in quality. Your last — and least — option is litigation, which is another inconvenient and costly business.

WHY DO IT?

Despite all these problems, many Canadian consumers continue to put up with the hassles involved in buying computer equipment in the U.S. or in other foreign countries. After all, lower prices and the sense of satisfaction that comes from owning a computer or peripheral device that is not available locally are very attractive, and many computer buffs find it hard to resist the lure. I hope that this article will help any ANTIC readers who find themselves in this position.



PHOTO: ERIK WEBER



DEAR ANTIC:

In the process of compiling this article, we learned that Norse poetry is not the only reading material enjoyed in Scandinavia; ANTIC also has a following there, as it does in many other parts of the globe. Readers of our magazine abound in such diverse places as Hong Kong, Italy, Panama, and even the sun-drenched West Indies!

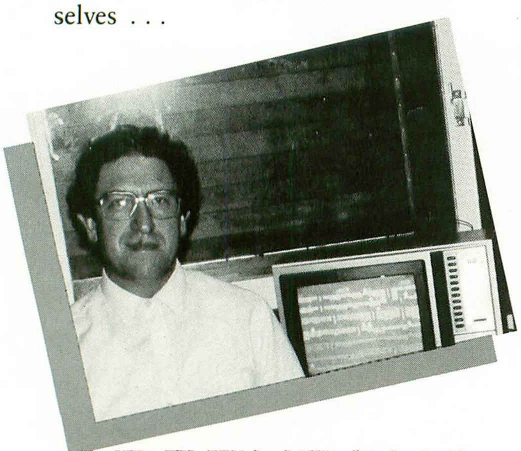
To Create this sampling of our readers, we randomly selected one representative from each country on our subscription list, and wrote to that person, requesting a short autobiography and a photograph.

continued on next page

Because we (and they) were forced to contend with a deadline, as well as with the vagaries of international mail service, we accurately predicted that some members of our random group would be unable to participate. However, we're extremely pleased to present the following letters from those readers who managed to respond. All of them were anxious to share a bit of themselves with you.

These readers are not only unanimous in their enthusiasm for ANTIC; they're also an interesting and varied assortment of people who are united beyond race, age and nationality by a common love of computing.

We had to condense these letters for publication, but we valiantly attempted to maintain the flavor of each writer's individual style. We hope that all of our guest writers are pleased with our editing, and, in some cases, our translations. Now, without further ado, we will let our international pen-pals speak for themselves . . .

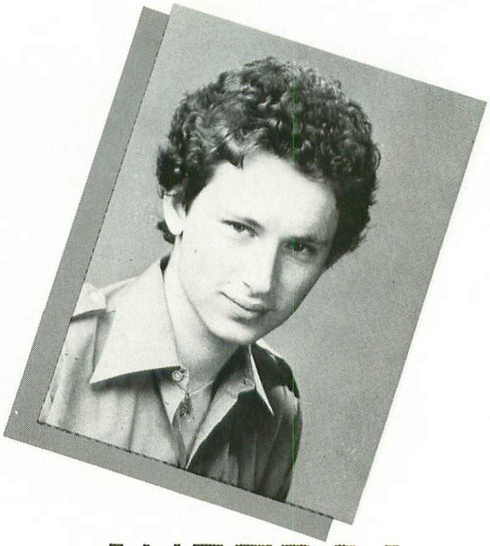


ARGENTINA

Tulio Jawerbaum
Ramon Falcon
1406 Buenos Aires, Argentina

I am 45 years old, and manage a wire and tube distribution company. At work, I program (in RPGII) an IBM 34 system with seven terminals. At home, as a hobby, I program an Atari 800 computer with 48K, and use an 810 disk drive, a 410 cassette recorder and an Epson printer. I use this system to relax and to study mathematics. My son (who is studying to be a computer systems analyst) and my two daughters also enjoy the computer.

I'm sorry to say that I can't write in your whimsical manner, because of my poor English.



AUSTRIA

Emanuel Sellner
Burgstallstr. 27
A-4523 Neuzeug, Austria

I was born on November 6, 1960, in Steyr, Austria, which is best known for Steyr bikes and cycles. At present, I study computer science at the University of Linz.

I own an Atari 800 with 48K, an 810 disk drive and an Epson FX-80 printer. I use the computer for my studies, e.g. to test algorithms. Privately, I use the Atari to manage my library and record collection. In my spare time, my friends and I play video games with the computer.

Other Atari enthusiasts should feel free to contact me.



BELGIUM

Roger De Spiegeleer
Rue de la Fonderie, 59
7100 La Louviere, Belgium

I am 31 years old. Since the advent of electronic flippers and war games, I've developed a passion for gaming. I first went crazy over **Pong**, and found contentment by playing it in restaurant lobbies.

In 1980, when I was finishing my studies in clinical psychology at the University of Liege, I bought the VCS 2600. The enclosed photo shows my daughter and me on our way to purchase the machine. The machine was the greatest — it had everything!

In 1982, I bought the 400, and since then I have ordered most of the programs for it from the U.S. The kindness and high degree of professionalism of the vendors for these products is extraordinary. This is much appreciated, because of the lack of software in Belgium. There is only one store here, and it imports anything *but* Atari and APX software. However, I am very pleased with the *Micro Video* store in Paris. At last, I have a place to go to talk about Ataris with other people who love them!



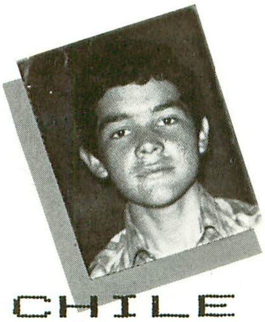
BRAZIL

Cecilia Z. Castro
Av. Afonso Pena 4040/1001
Belo Horizonte, Minas Gerais,
Brasil — 30000

I am in my junior year at Universidade Federal De Mínas Gerais, where I study computer science. I first saw a computer as a high school junior in San Jose, California, where I lived with relatives from 1979 through 1980.

I share my Atari 400 with my parents and four brothers. I'd like to use it more seriously, but I do miss the help of a disk drive and a printer (which I plan to buy someday in the future). So, we mostly use the computer to play video games.

My dad is the one who loves it the most — he's what you would call an authentic "MAMA's boy." (ANTIC, Vol. 2, No. 1)



CHILE

Renato M. Miranda
114 Correo 35
Santiago, Chile

I am 18 years old and in my last year of high school. Besides living in Chile, I have lived in Ecuador and visited the United States.

I started on the Atari 400 at my father's computer store in Quito, Ecuador. At the end of 1982, we moved back to Chile, where we now own a computer store called Compu Ram and sell Atari computers and programs.

My main interests concerning the Atari computer involve its wonderful graphics and sound capabilities. At present, I am working on a Chilean geography-teaching program and a 3-D structure-rotation program.



FRANCE

Rene J. Choulet
29 Avenue du Stade
92500 Rueil-Malmaison, France

I am 39 years old and work in the corporate finance department of a bank. I had long used a computer in my office, but I wanted one at home for recreational and educational use. In 1982, after having seen a demonstration of the Atari 800, I bought one of the first Ataris sold in France — an 800 with 48K and a 410 recorder.

We have used the Atari almost exclusively for playing games bought in the U.S. or typed in from ANTIC. We will soon have a printer and I will then teach BASIC to my wife and sons.

I am not yet ready to write technical articles and teach tricks to your readers, but I wish to start some personally ambitious projects soon, such as file managing and budget planning. However, I am waiting for a less expensive, more efficient disk drive, as well as more time — I usually get home at 8 p.m.



HONG KONG

Anthony Kwok
10, Shing Yip Street
5/F, Kwun Tong
Kowloon, Hong Kong

Born in Hong Kong and educated in England, I graduated from Manchester University in 1978 with a B.Sc degree in computer science. I remained in England and worked with Plessey Controls Ltd. as an engineer.

After two years of designing hardware, I turned to software development and joined ICL as an operating systems designer. Then, having suffered through one of the worst winters ever, I returned to the tropical climate of Hong Kong in 1982. That was the beginning of my involvement with Atari. I was offered a job as the Regional Technical Manager of Atari International (HK) Ltd.

Obviously, working with micros is quite different from mainframes. You cannot play **Pac Man** on ICL computers!

ICELAND

Thorarinn Jonsson
P.O. Box 12
270, Varma-Iceland

I got a letter from you yesterday about representing Ireland, but I'm from *Iceland!* Please excuse my English, as it is very bad and is written with the help of my pocket dictionary.

I was born in New Haven, Connecticut, U.S.A. In August, 1947, I left the U.S.A. with my parents to live in Iceland (they were students from Iceland).

Now, 40 years later, I can hardly write or speak English, but I understand some. I own an Atari 800 with 48K and an 810 disk drive. The computer is used for learning computer programming in BASIC, and also for recreational pursuits.

This is almost everything there is to say about me. I'm single, have no wife and kids, own nothing . . . no car, no house. I'm very fat and bald, so you do not get a photo of me.



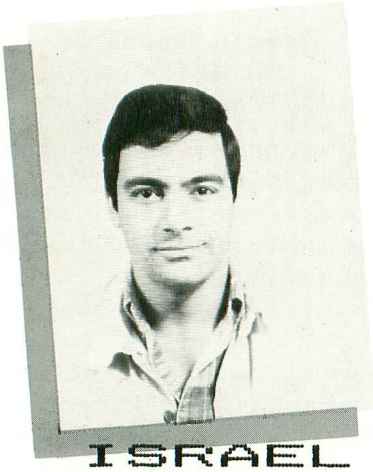
ICELAND

Haraldur Vidisson
Hraunbraut 34
200 Kopavogur, Iceland

My first acquaintance with computers was when I worked in the loan department of a bank. I took a course in BASIC, and started working as a computer operator at the same bank. Two years later, I got a job as a programmer on an IBM S/38 at Iceland's largest shipping company.

There, through my colleagues, I discovered the Atari. I liked Atari from the start and bought one of my own quite soon after I first saw one in action. Today I own more than 30 games, along with the Assembler and BASIC cartridges.

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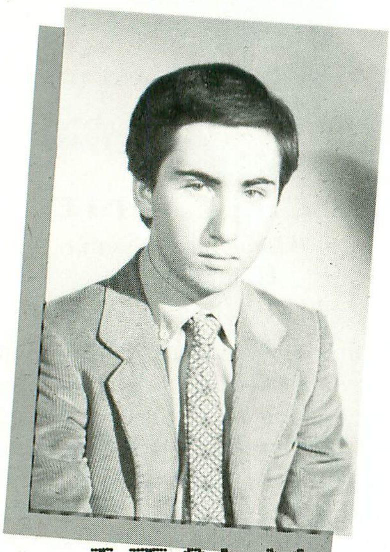


ISRAEL

Nadav Yehiel
14 Lea St., Apt. #13
Tel-Aviv 69412 Israel

I am a 29-year-old computer technician and have been working with computers for eight years. I am primarily interested in personal computers for graphics.

I had always wanted to buy a home computer, but only recently did I find the one I wanted, the Atari 800. Since it's very easy to program and operate, I wrote a few programs for my son. These include math programs and some programs for painting on the screen with a joystick. The next step will be to redefine the character set so that he will be able to learn the Hebrew alphabet.



ITALY

Roberto Bianchini
36 Regina Giovanna
Milan, Italy 20129

I am glad to tell you who I am and what I do in my life. Born in Milan, Italy, on July 20, 1962, I now attend the Medical School at the University of Milan. Approximately two years ago, I discovered that using a computer was, like sports, an amusing — yet intelligent — way to spend my free time; that's why I bought my Atari 800!

I have looked for "medical" software, but my efforts have been in vain. I would be very grateful to your great magazine if you would let me know of the existence of any such software.



NEW ZEALAND

Murray Steedman
122 Mill Rd.
Whangarei, New Zealand

I was living in Australia when I first became interested in home computers and computing. I chose the Atari because of its superb graphics and the tremendous availability of software. Also, four of my friends owned Ataris, so the exchange of ideas and programs made my life a little easier.

In New Zealand, I run my own gymnasium, and I've used the Atari to help me run the business. I've written programs on diets, nutrition, workouts and the financial aspects of running the gym.

For recreation, I like playing adventure-type games. However, I find software availability in New Zealand is limited, so I correspond with friends in Australia and America and usually get programs and advice when I require them.

PANAMA

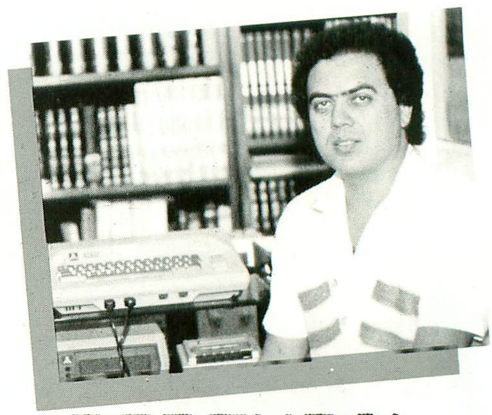
Guillermo R. Gonzalez
Apartado 24, Panama 9A
Panama, C/A

I was always interested in computers. For this reason, I went to study at the Shippensburg University in Pennsylvania, U.S.A., where I received a Master's degree in computer science.



Because of its low cost and excellent graphics and sound capabilities, I bought an Atari 800, which I have used for two research projects. One project involved the use of INTER-LISP; the other was a program designed to teach little kids how to use the clock.

I now use the Atari to keep students' records, play games and study machine language. I will be glad to hear from other Atari users worldwide.



PORTUGAL

Carlos da Silva Pereira
Rua Pinheiro Borges, 22-3. c
Alfragide 2700 Amadora, Portugal

I am a Portuguese architect, aged 38. I live in the neighborhood of Lisbon, together with my wife and two children. I was introduced to video-game systems two years ago through the Atari VCS. Having owned this excellent system, I developed a greater interest in computers, so I decided to buy one which would be applicable to my professional life and useful in my spare time.

I bought an Atari 800 with disk drive and cassette recorder, and am studying Atari BASIC so that I can apply it to business use in the near future. I am also interested in utilizing the Atari's graphics capabilities.

I would like to say how much I appreciate Atari software and its excellent sound and graphics capabilities, which make the Atari one of the best home computers on the international market.

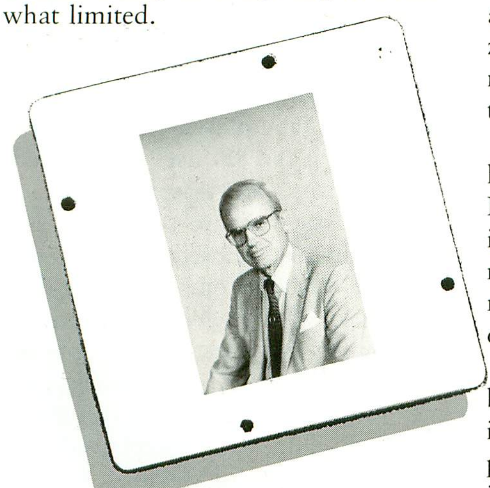
SCOTLAND

Gordon Sinclair
#2 Hillside
Mosstowie By Elgin
Moray, Scotland

I am a 31-year-old social worker who lives in a small village. I have been interested in computing for a number of years, but I only recently purchased an Atari 800 and a 410 recorder.

I also obtained an Assembler Editor cartridge, because of my desire to learn more about machine code, but quite frankly found it to be limited in comparison with other products on the market.

There are no Atari clubs in this part of Scotland; therefore, if anyone is interested (particularly in America), I would like to exchange notes and tapes on Atari computing. I would stress, however, that I am but a beginner, and my understanding of computing is somewhat limited.



SWEDEN

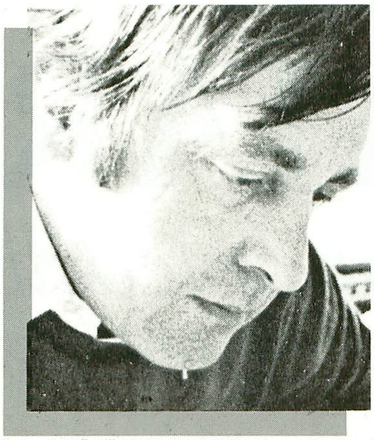
Dick de Jounge
Narvavagen 21
S-114 60 Stockholm, Sweden

Computing was a pastime occupation when I purchased my Atari a year ago; **Pac-Man** became my favorite, as well as that of my family.

My interest in computing has since become more serious, thanks to my joining the Datagallerierna (a distributor chain for personal computers), and my Atari **VisiCalc** program, which has been good support.

Now, computing is not only a pastime occupation, it is also part of my livelihood. Nevertheless, it is still great fun!

I hope that software programs will continue to mature in usefulness, to the benefit of the home computer owner.



SWITZERLAND

Walter Luc Haas
Pilgerstrasse 5
CH-4055 Basel, Switzerland

I have an Atari 800 and I use it for recreational as well as professional purposes.

I write regular columns with reviews of games — one for a Swiss newspaper, and others for Swiss and German magazines. I get to play games, games, and more games, which I also collect. I have thousands of them.

I came to my present vocation after having studied Protestant theology and French/German history, and after having been a teacher. I find free-lance journalism, with an emphasis on game reviews, to be a fascinating way to spend one's life.

Because of the subject matter, I have become something of an expert on gaming, and I must say that my Atari computer has contributed to my education in this area. It opened up a whole new world of gaming for me, from which I have received a great deal of pleasure.

TAIWAN

Masahiro Mori
P.O. Box 988
Taichung, Taiwan R.O.C.

I am one of the Atari lovers. I am 13 years old.

I like the Atari because it is easy to use. I use my Atari to program, and I have written a lot of programs. Most of them are graphics programs. (I have enclosed



one of them with this letter. It generates five circles, which combine to make an Olympic symbol.) I use my computer almost every day, but not when I have homework. Sometimes I use it to play games, though.

I would like to learn a lot from ANTIC, because there is nowhere else to learn from, and I wish all the subscribers could get to know one another.



WEST INDIES

Stewart Gordon
P.O. Box 244
St. John's, Antigua, West Indies

Thank you for your letter, but I would like to point out that I do not live in the French West Indies, but in the West Indies. That is probably the reason that I have only received one ANTIC magazine these past few months.

I am 11 years old, and have lived in the West Indies, the U.S.A., Korea and Indonesia.

My father bought me an Atari 400 in Hong Kong in 1981, but I sold it before leaving Indonesia. I bought my Atari 800 in Miami, when I was on my way to Antigua to live.

I use my Atari for games and for typing, word processing, and writing simple programs.

THIRD WORLD ATARI

Computing in antebellum Grenada

by DR. LINT HUTCHINSON

After spending three years as a professor at St. George's University School of Medicine in Grenada, the trials and tribulations of Atari users in the States seem like duck soup to me. When was the last time that your electric company turned off the power three or four times a day because the Cubans were blasting? Or that the lights dimmed and your file disappeared because a cow had knocked over the power lines? Or, better yet, imagine that it's evening and the Grenadians are unloading a special Russian cargo ship – and that, as a result, the entire country is without power until "later."

At St. George's, I was involved in the development of computer-assisted instruction programs used to prepare students to qualify for American medical programs. This work resulted in a comprehensive MSKP (Medical Science Knowledge Profile) Review that covers all areas of medicine on which the students are to be tested. It runs on an Atari 800.

However, developing educational software and being able to use it eight hours a day are two different things – especially in Grenada. For instance, when I went to the only electrical hardware store on the island, I found that a much-needed six-foot extension cord cost $30! There were no two-prong to three-prong connectors at all, and to top it off, the island uses two different types of wall plugs that have to be seen to be believed.

Dr. Lint Hutchinson taught at the St. George's University School of Medicine for three years, and left the island of Grenada shortly before last year's coup and U.S. rescue operation. He holds a Ph.D. in psychology, and is involved in the design of instructional systems for medical students. He has more than 15 years of computing experience.

CUSTOM-MADE DIFFICULTIES

These were just a few of the commonplace inconveniences I encountered in the West Indies, where computers of any shape, size or description are rare.

The first obstacle I ran up against was customs. After all, the British left Grenada, their former colony, with a highly developed sense of procedure. When you inform a customs agent that you want to bring a computer into the country, you have to be prepared to dedicate the next four hours to filling out a vast number of forms. These help the authorities to determine which classification a computer should come under: electronic equipment, typewriters, or toys. In the meantime, two or three customs agents will attend you. But make no mistake about it – once a decision has been made, all the tea in China will not alter it.

If your computer is classified as electronic equipment, you must pay a duty of 105% of its total value before you leave customs. If, on the other hand, it is categorized as an electronic typewriter, you will be charged only 30–50% of its value. And if you are very lucky, and it is deemed to be a toy, you don't have to pay any duty at all. Sometimes, however, the authorities will simply confiscate your equipment to see if it has any military applications.

RISKY BUSINESS

The first time I entered Grenada, it took me at least two hours to convince customs that my Atari 810 was *not* an eight-track tape player. I patiently explained that the 810 uses single-sided, single-density, soft-sectored, 40-track floppy disks that are something like record albums enclosed within protective covers. My customs agent promptly informed me that each record that enters the country is subject to a $10 import duty. Since I had ten boxes of disks with me (and 10 × 10 × $10 = $1000), I quickly backtracked and explained that, actually, a floppy disk was made of magnetic tape. The agent noted (just as quickly) that there was also an import tax on all cassette tapes that were brought into the country!

A VALUABLE LESSON

Once I'd recovered in Grenada's warm, crystal-clear, tropical waters from the trauma of having made some unexpectedly large contributions to the island's economy, I decided it was time to get down to some serious computing.

It was only then that I discovered the primitive nature of the island's electrical

system. Most Caribbean nations use a 220-volt current at 50 Hz. This current must be converted to 110 volts for computing purposes (Atari 800's work on 50 Hz). So, unpacking my computer equipment, I took out a converter that an electronics expert in the U.S. had guaranteed would handle anything from an electric shaver to a computer. I plugged it into my system, and for the first 45 seconds everything worked just like it had back in the good old USA. Soon, however, I noticed a strange smell and saw black smoke pouring from the back of my monitor. The converter started to buzz and then slowly melted into a puddle of darkened plastic. Then, nothing. I had just learned the difference between a converter (which is what I had) and a transformer (which is what I needed).

REPAIRS?

Getting a computer repaired in such a setting is no easy feat — in fact, it's just about impossible. What do you do with a burned-out Atari in a country where there are no T.V. stations, and where you are required to carry a license to operate a transistor radio?

The only practical solution is to send it back to the United States to be repaired. The postal regulations of each island nation in the Caribbean vary, but generally packages cannot be insured by the Post Office, and packages that are sent through the mail tend to wind up in the Bermuda Triangle. With luck, though, you can have your Atari fixed and returned to you in as few as six months. And when your equipment finally does arrive, a friendly customs agent will want to talk to you about import duties.

LIVING IN THE PAST

If you can gear your computer needs to a time frame out of the 1950's, you should be able to use your equipment even in far-off places like Grenada. For example, rather than using fan-fold computer paper, which is non-existent in the islands, you should substitute the paper rolls that are common in the West Indies. You should also make sure that each piece of equipment, from a power adapter to a surge protector, has a double fuse. (You'll soon discover that in the Caribbean a 220-volt current can run anywhere from 170 to 260 volts.) Furthermore, you'll need to adjust the speed on your disk drive at least twice a day, and backup your programs every 15 minutes or so. It's best to keep two backup copies of any program you're working on.

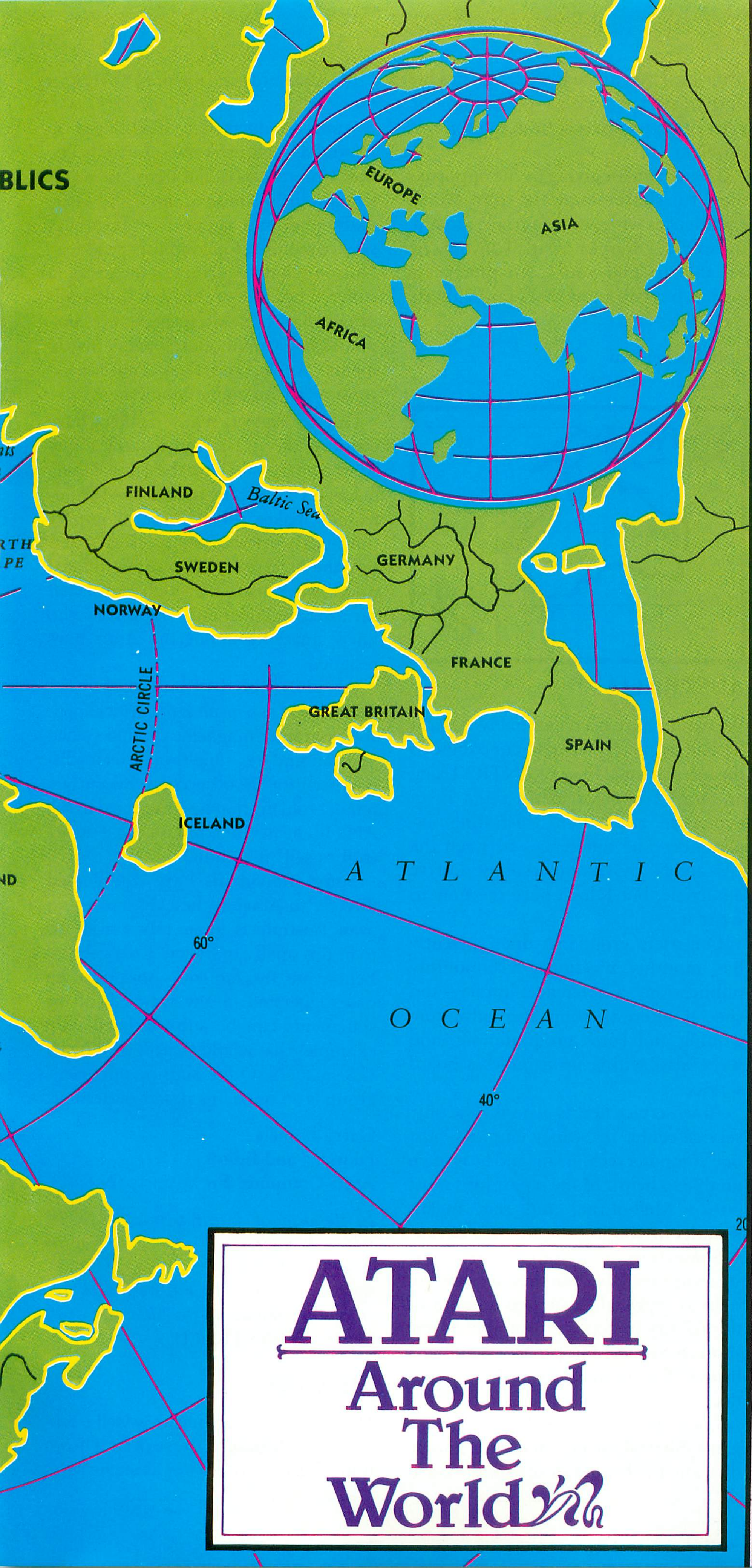
Finally, it will quickly become clear to you that special precautions must be taken regarding the storage of your floppy disks. If your disks are not kept in a cool, dry place, you may someday open a storage box to find that a green slime or a while mold is enjoying the fruits of your modern technology!

ACCEPT THE CHALLENGE

If you ever find yourself computing on a sunny beach somewhere in the Caribbean, remember to enjoy these minor inconveniences. Consider them to be challenges, rather than major obstacles. It's the only way to survive as a Third World Atarian.



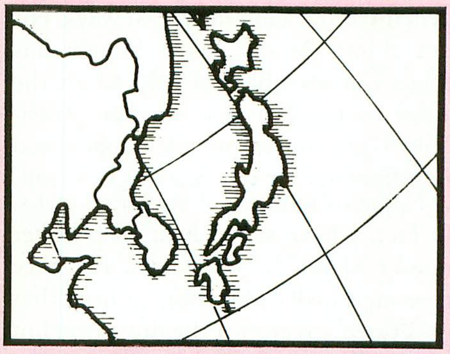
JAPAN
CHINA
MONGOLIA
UNION OF SOVIET SOCIALIST RE
40°
Sea of Okhotsk
PACIFIC
OCEAN
Bering Sea
Bering Strait
120°
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140°
40°
160° E
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ARCTIC
NORTH
POLE
180°
OCEAN
160° W
POINT BARROW
140°
120°
80°
GREE
Baffin Bay
Davis
CANADA
Hudson Bay
UNITED STATES
NORTH AMERICA
SOUTH AMERICA



ATARI Around The World

As a part of our effort to solicit information from Atari users abroad, ANTIC sent queries to the Atari Users' Groups we could identify outside the U.S. The responses printed here have been edited for language and clarity. In some cases it was difficult to read the name of the correspondent. We apologize for errors and thank you all for your replies.

—ANTIC ED



JAPAN

The Fuji Atari Users' Group, which serves the cities of Tokyo and Yokahama, has twenty-some members. Most of them are gamers, even though there are no commercial sources of Atari gameware nearby. And our few business users must endure long mail order delays unless they are able to travel stateside. As you can imagine, the failure of copy-protected software from companies that do not provide backups is more than a mere inconvenience here in Japan. We have no hope of attaining commercial, Japanese-language software or documentation, but we do have Nagata-san.

Nagata Makoto-san is the practicing genius of the Fuji Atari Users' Group. We have other hardware wizards, programming aces, and guiding lights, but Nagata-san always gets the tough questions and is almost always able to answer them. He provides us with the confidence and motivation we need to undertake any project (". . . well, I'll try this for now — I can always ask Nagata-san . . .").

When any cockeyed new concept is introduced, Nagata-san will make it work, whether with a BASIC one-liner or a safety pin. One example is his home-brew Epson printer interface. (Epson printers are cheap and easily available in Japan — just the opposite of Atari

continued on next page

printers.) Nagata-san learned of someone halfway across the island of Honshu who was interfacing through joystick ports. He then mastered the crucial concepts, helped our hardware specialist make the cables, and assembled the printer-handler himself.

His software includes a bootstrap program that can load a set of Japanese *kana* to replace the English characters, and he has adapted several utilities to manipulate this Japanese character set. This has benefitted our club in several ways. For one thing, Atari's Tokyo branch has asked our members to help adapt the Atari to the Japanese market. Atari-Tokyo graciously provides space and refreshments for our meetings as well.

Nagata-san is not above small tasks. In fact, I have yet to hear of a better master of BASIC one-liners. He once gave me a disk of his short utilities that uses three screens for the directory, but still has 500 free sectors. One-liners seem to be second nature to him. Club members often show commercial, published or hand-embroidered software at our meetings, and it's usually a good bet that our practicing genius will recreate their effects, however dazzling, with a single line of BASIC code.

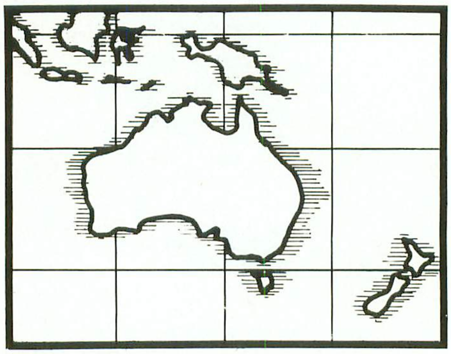
An important aspect of any practicing genius is diversity. Nagata-san knows the Atari's hardware, Operating System (OS) and BASIC cartridge as well as if he had written the documentation for them last week. He also has a good eye for quality software. He recently typed in a music system from a magazine that several other club members saw but ignored. They were anxious to get a copy after he demonstrated the program.

Nagata-san even shows a touch of genius with gameware. For example, we had a copy of **Sands of Egypt**, an excellent graphics adventure from DataSoft for a limited time. Although a couple of us worked on it for days, we could not escape the desert and find our way to the more interesting images that we knew awaited us. Nagata-san offered to help, even though English is not his native tongue. Not only did he crack the puzzle, he was disappointed that he had not beaten the author's best score.

Perhaps Nagata-san's single greatest characteristic is his "can-do" spirit. His accomplishments embolden all of us to attempt and complete formidable projects. Even in areas where he has no particular expertise, his special point of view often provokes a fresh look at the problem.

Thank you for giving us the opportunity to share some of our Atari experiences with other Atarians around the world. I don't know if all of you will be able to find your own practicing genius, but I do know that ours has been a real blessing.

Bob Rutherford
Fuji Atari Users' Group



AUSTRALIA

We would have been extremely upset if we had not been invited to contribute to the International Issue of ANTIC. Using an Atari computer in Australia is an expensive and often frustrating experience. The differences between the PAL and NTSC computers alone deserve an article, but I don't have the time to write it.

Our users' group in Sydney currently has monthly meetings, a bimonthly publication, a reference library, and special interest groups for adventure gaming and Forth programming, and we're also setting up a bulletin board service.

Atari service here is dismal. The only service center in Sydney employs just one computer technician (and he is often unable to help). Many repair jobs must go to Melbourne, and that means months of waiting.

Some Atari-brand software and accessories are available, but they are substantially overpriced. A limited amount of third-party material is available at one shop in Sydney, but prices are inflated by the 35% import duty and 20% sales tax.

Local goods are few. I know of one game, **Shaft Raiders** (a **Scramble** knock-off), and I've heard rumors about "back-yard" keyboards and memory boards for the 400.

Atari products are distributed in Australia by Futuretronics Australia Pty. Ltd. Unfortunately, Futuretronics seems to have little concern about the sales, marketing, user support or after-sales service required for computer products. Not only have Atari users in Australia suffered because of this, but thousands of sales have been lost to aggressive companies like Commodore, Texas Instruments, Apple, and Dick Smith Electronics (an Australian company).

Due to neglect, many retailers have dropped the Atari, and I know many Atari owners who have tried to sell their machines out of pure frustration. Futuretronics makes no attempt to import third-party software or accessories, and sells the Atari products at super-inflated prices. They also have a high rate of staff turnover, and their only employees who knew anything about the Atari have resigned.

ANTIC is also distributed by Futuretronics, and as a result is the most expensive computer magazine around (when you can find it!). One shop sells it (discounted) for $6.00 a copy. Recently a retailer told me that he is expected to sell ANTIC at a lower price than Futuretronics sells it to him.

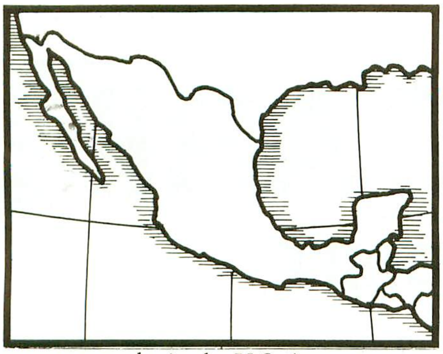
Some individuals have complained directly to Atari in the U.S., but to no avail. Australia is apparently considered to be too small a market to worry about. Believe me, this lament is not puffed up or exaggerated in any way. All of my statements can be substantiated with examples that would shatter your lucky U.S. readers. Quite simply, our users' group is an oasis in a desert of despair!

Garry Francis
Founder and Editor
Atari Computer Enthusiasts (N.S.W.)

In defense of Futuretronics, ANTIC notes its aggressive interest to import ANTIC when we were new. The price reflects in part that Futuretronics airships our magazines to Australia at its expense. —ANTIC ED.

MEXICO

Home computing is not very well established in Mexico, so those of us who do it in Mexico City are not as exclusive as



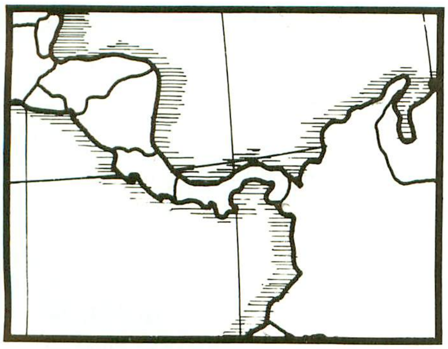
you seem to be in the U.S. Any computer at all is good enough for our users' group, and we're very interested in ways of linking together various machines such as the Atari, the Commodore, etc.

We have only one dealer here, and his supply of hardware and software is small. We have also received some help from Atari in the form of information and books.

As far as we know, no special software has yet been developed here in Mexico for the Atari. Our own efforts have been spent trying to bridge the compatibility problems among our various computers.

We need all the help we can get, and it would be great if Atari would send someone down here with all of their latest products.

Alex Olesnowicz
Atari Owners & Users Group



PANAMA

We are very pleased to hear that ANTIC is doing an International Issue. Those of us who receive the magazine are quite pleased with the work you are doing.

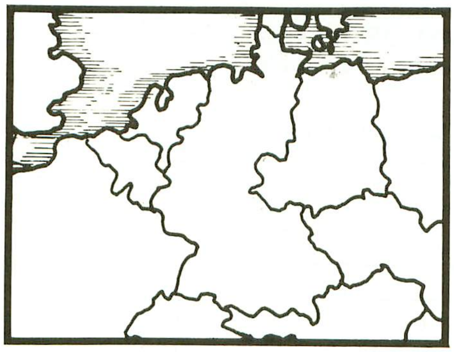
The Panama Canal Atari Users' Group includes both Atari computer owners in the Republic of Panama and users who are with the U.S. military forces stationed in the Panama Canal Area. We meet once a month at Panama Canal College, which is located at the Pacific entrance to the canal.

Our club has just welcomed its 100th member! Our goals are to promote friendship and to help owners of Atari computers with their hobby. We also provide an electronic bulletin board service (Balboa 52-2401). We have no affiliation with Atari, and do not receive any support from our local dealer.

The main problems we encounter in this beautiful, tropical land are that disk-drive heads frequently go out of alignment, and RAM and ROM boards often go bad. There is no service facility anywhere on the Isthmus, so most of our gear goes to the U.S. for repair via the mail. Some Atari accessories and software are available locally, but there has been no local development of either software or hardware to date.

We hope that Atari and other American computer companies wake up soon to the fact that there are a number of markets to be developed throughout the world. They should spend some money to see what can be done in other nations. Otherwise Japanese computers will conquer the world while the U.S. sleeps on its laurels.

Dr. Carlos Lam
Panama Canal Atari Users' Group



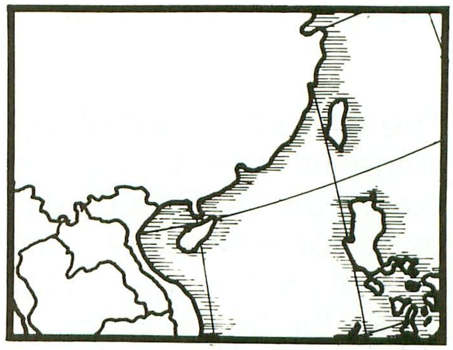
WEST GERMANY

Our group is made up primarily of people from the Defense Department's school for American dependents here in Wiesbaden. We meet regularly to teach each other about new software, and we also hold demonstrations about computers in action for others in the community.

I know of no local support for Atari computing, but we are entitled to U.S. mail service, so we do most of our computer shopping by mail. Some German shops do carry software, but their prices are very high. Service is also a problem; any information you have about Atari repair service in Germany would be most appreciated.

"The Computer Encounter" organization here developed a fantastic grade book, class schedule and student-attendance program for us. Now we need some double-density disk drives to make use of it.

Gordon Jones
Dependent Schools
Wiesbaden, West Germany



HONG KONG

There are no serious problems associated with using Atari computers here in Hong Kong. It is relatively easy to understand Atari BASIC, and to operate the system. We also have several stores that sell and service Atari equipment and software, and the Atari is very popular here.

In our group, every member is required to write a program each month to share with the other members. We get together once a week to discuss our programs. So far, however, none of our programs are available for sale.

We're glad to hear about ANTIC's interest in Atari use around the world, and are glad to be a part of it.

(unsigned response)
Hong Kong Atari Club



CP/M ON THE ATARI!

HOW? WITH THE INCREDIBLE

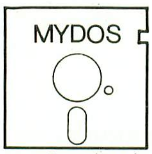
ATR8000

The ATR8000 is a 4 MHz, Z80, 64k RAM, CP/M microcomputer that is also the complete ATARI interface. Besides bringing CP/M to the ATARI home computer, the ATR8000 also enhances the ATARI's operation. The ATR8000 has ports for running a serial or parallel printer for ATARI DOS, complete with a built-in 48k buffer. And, the ATR8000 enables the use of standard 5¼" and 8" drives for ATARI DOS!

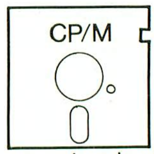
The ATR8000-ATARI system runs these DOSes:



This is the operating system of ATARI computers. The ATR8000 runs this DOS from any standard disk drive or from an ATARI 810 disk drive.

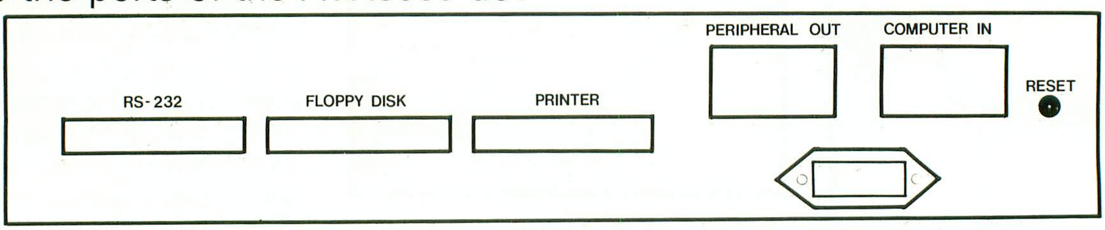


This multi-density DOS is an ATARI compatible DOS. In single density, it runs on an ATARI 810 or a standard drive. In double density, MYDOS runs on standard drives, single and double-sided, 5¼" and 8"!



This popular operating system comes with the ATR8000. It is a double density DOS that runs on standard drives. The ATR8000 reads CP/M disks from many other microcomputers, too!

What do the ports of the ATR8000 do?



Runs a serial printer or a modem in ATARI DOS and CP/M operation. Includes an automatic 48k printer buffer in ATARI operation. Software includes modem programs.

Runs both 5¼" and 8" standard disk drives. Runs up to four drives that are any mixture of size, density (single, double or quad) and type (single-sided or double-sided).

This standard parallel port runs a parallel printer in ATARI and CP/M operation. Includes an automatic 48k printer buffer in ATARI operation.

Interfaces ATARI peripherals to the ATR8000 for use in ATARI operation. Peripherals, like an ATARI 810 drive, are connected with an ATARI Daisy Chain Cable.

The ATARI home computer is connected to the ATR-8000 here. For CP/M operation, it is also possible to connect an RS-232 terminal here.

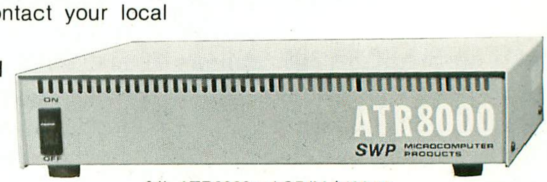
Trademarks: ATARI, ATARI DOS, ATARI 810, ATARI, INC. ATR8000, SWP, Inc. CP/M, Digital Research, Inc. Z80, Zilog.

The ATR8000 is a product of:

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metro 469-1181



64k ATR8000 w/ CP/M $499.95

FUJI IN FIJI

Kids keen about computing

by ROB PATTISON

As a schoolboy, I collected stamps and dreamed of faraway lands. That's how I discovered Fiji — the stamp showed its longitude (180° west) and latitude (18° south). It was almost exactly on the other side of the globe from my home in England. Now I live and work in Fiji, and try to use my Atari 400 to teach students and amuse myself here.

My non-Fijian correspondents seem to think that all we do here is lie on the beach and sip drinks from coconut shells. They can't believe that we are serious about computing, but we are! The first meeting of the Fiji Computer Club packed the hall with 160 people. Granted, not many of them knew anything about computing, but they were all interested.

I now use my Atari in my classes at Lelean Memorial School, and the pupils are keen to learn. My wife has to chase them away after class. I guess they're hooked — like me.



Sashi and Monica, pupils at Lelean Memorial School, Nausori, Fiji.

But living 2,500 miles away from help is not easy. I bought my computer and a 410 Program Recorder in England before I left there. The salesman guaranteed that my system would work with the television sets used in Fiji. Not so! But I finally found one here that will work. Also, I had loading problems with the 410 right from the start. It took eight months to discover two blown capacitors and replace them. My elation over my first successful load could not have been much less if I'd won the Nobel Prize.

The first time I brought the computer to school, the students were dumbfounded. Many of them had never even seen a TV before, much less a computer. I ran a little homemade program to demonstrate some of the things a micro can do, and you could hear a pin drop. Then I booted a math-drill program and asked for volunteers. No one moved. Finally, a local teacher came forward and did it. The children slowly approached to watch, and soon they were vying for turns. Two hours later I had to beg them to let me eat lunch. The barrier was broken.

continued on next page

I first learned about computers and programming while working as an engineer on aero-engines at Rolls Royce in the United Kingdom. Later, I studied some microcomputers in development at Cambridge. When I saw the Atari on the commercial market, I was impressed with its design and capabilities. The price dropped just about the time I was departing for Fiji, so I decided to take one along.

My new dream is to help students in third-world countries get the thrill from doing experiments that motivated me so powerfully as a youngster. The microcomputer is one tool that can help make that dream come true. For example, a computer costs less than an oscilloscope, but can simulate some of the things an oscilloscope can do. The next minute it can present something completely different.

Our computing efforts are not without local hazards. Two diesel generators supply power to the neighborhood of our school. When the operators switch generators, voltage sometimes drops so low that RAM is lost. Sometimes the local load reduces voltage, too. A recent hurricane flung trees across the power lines, and the voltage spike blew up a ROM chip on a friend's computer.

A colleage at the University of the South Pacific has an Atari 800 with disk drive — am I jealous! He brought it to our school to demonstrate some math programs. It was great to copy his code onto cassette for my students later on.

We teach in English, but that is the second language for our pupils, and that's one reason the visual aspect of computing is so important here.

A local merchant sells Atari game machines and cartridges, and we have gotten him interested in carrying the computers and software as well. But the market is not big. There is no broadcast TV in Fiji, so the only TV sets are those used with videotape recorders, closed-circuit setups, or game machines. Still, the editor of the *Fiji Times* is a keen promoter of computers. We have thought about setting up some Atari systems for public access as a way of spreading interest. We would train someone to demonstrate them and enroll people for instruction. We are convinced that this approach will work here.

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JOHN DROOYAN

According to Coach Selinger, the U.S. Women's Volleyball Team is one of the three best in the world.

ATARI'S OLYMPIC TEAM

U.S. women go for the gold medal

by DAVID F. BARRY

According to the coach of the Atari-sponsored U.S. Women's Volleyball Team, Dr. Arie Selinger, the team has reached what he calls "the seventh dimension," and this might be just the extra boost it needs to capture the gold medal at the 1984 Summer Olympic Games in Los Angeles.

David F. Barry is a technical writer in the computer field, and the author of an upcoming book on the word-processing program Wordstar.

"The seventh dimension is the team dimension," Coach Selinger explained during a recent interview with ANTIC at the team's training camp in Southern California. "You know when a team has it — you can feel it. In volleyball we have six players on the court, so we call it the seventh dimension."

A CHANCE AT THE GOLD

In eight years as head coach, Selinger has built a solid framework within which this added dimension can flourish; and in so doing, he has brought the U.S. team, once unranked and unrespected, to its current standing as one of the five top teams in the world. And because the 1984 Summer Olympics will be held on U.S. soil, many suspect that this team

will do what no U.S. Women's Volleyball Team has yet done: win an Olympic gold medal.

"When we beat China 3–0 in the 1982 World Championship games," Selinger recalls, "I felt that the U.S. team was the best in the world, even though we didn't win the tournament."

With the 1984 Summer Olympics just months away, Coach Selinger excudes a sense of cautious optimism. He knows, only too well, the calibre of competition at the Olympics.

"In this Olympics," he notes, "there will be eight volleyball teams competing. The differences between these eight teams are small, and on any given day, any team can beat another. This is very different from the time when teams like Japan and the Soviet Union were far ahead of everyone else. At this point, I can identify three teams that seem to be slightly ahead of the others: China, Japan, and the U.S.A."

STUNNING PROGRESS

Whether or not they win the gold medal this year, the team's progress over the past eight years has been stunning. Three years after Selinger's arrival, the U.S. women unexpectedly captured fifth place in the 1978 World Championships. Four years later, they took the bronze medal. In between these triumphs, the team began a rigorous schedule of international competition that was unheard of before Selinger came on the scene.

"Before I started," Selinger explains, "a team like Japan would play the U.S. maybe once a year. We now play about 70 international matches annually, and every top team wants to play us."

Formerly the head coach of the Israeli Women's Volleyball Team (1965–1969), Selinger has brought a much-needed international perspective to the U.S. team. A thoughtful, intelligent man with a granite jaw, Selinger says that this is unquestionably the best team he's ever coached. He gives much of the credit for the team's good fortunes to the United States Volleyball Association (U.S.V.A.).

THE BENEFITS OF EXPERIENCE

Thanks to the support of the U.S.V.A., the U.S. team is entering an Olympic volleyball competition with tremendous depth of experience for the first time this year. Between them, four of the team's members (Flo Hyman, Sue Woodstra, Debbie Green, and Carolyn Becker) have — at eight years apiece — 32 years of international experience.

Flo Hyman, at 6′4″, is thought of by many as the best female volleyball player in the world. She joined the National Team in 1975 and has since participated in every major competition for which the team has qualified. Her searing spike is studied by teams around the globe.

Debbie Green, though only 5′4″, makes up in speed and agility what she lacks in height; she is considered one of the best setters in the world. Sue Woodstra, the team's captain, is best known for her serve reception and defense. Carolyn Becker, 6′0″, shares setting duties with Green.

The team has also been strengthened by the addition of some younger players. At 5′8″, Rita Crockett has the highest vertical jump on the team, and Paula Weishoff's dominant net play helped USC win the NCAA championship a few years before she joined the National Team. Clearly, the U.S. has a team of great depth and diversity.

AID FROM ATARI (& OTHERS)

With the aid of sponsorships from corporations such as Atari, Ford, and Misuno, the U.S. Women's Volleyball team has been able to practice year-round at training facilities in Southern California at Coto de Caza. The team trains six hours a day, five days a week. Without corporate involvement, this kind of schedule would be impossible. Before corporate sponsorships were instituted, U.S. Olympic teams often came together only a few weeks before the Games began, and were able to practice only intermittently.

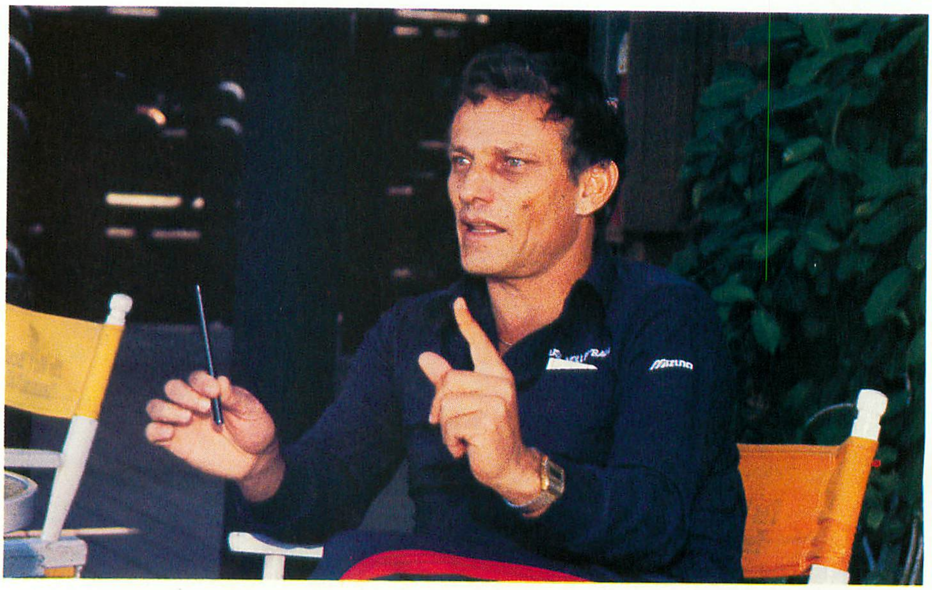
COMPUTERS TO THE RESCUE

In addition to inaugurating a more rigorous training schedule, Selinger has turned to computers to help improve his team. Atari computers are used to keep track of many of volleyball's dizzying array of statistics, which include variables such as the percentage of successful spikes per game, as well as the number of blocks, kills and other important plays. These statistics are fed into an Atari 800 computer in the coach's office, and analyzed by the coaching staff. Using this information, charts are produced which graphically represent an athlete's performance (and compare it to statistics from earlier matches, to the performances of other athletes, or to a standard unit of measurement). These charts hang on Coach Selinger's office wall and are carefully studied by team members.

Additional computer assistance is provided by Coto Research Center, which is two doors down the hall from the Volleyball Team's office. There, as a

continued on next page

JOHN DROOYAN



Dr. Arie Selinger, coach of the U.S. Women's Volleyball Team.

THE 1984 U.S. WOMEN'S VOLLEYBALL TEAM:

Seven members of this year's thirteen-member U.S. Women's Volleyball squad were on the Olympic Team that boycotted the 1980 Summer Games in Moscow. These women (Sue Woodstra, Julie Vollersten, Flo Hyman, Debbie Green, Laurie Flachmeier, Rita Crockett, and Carolyn Becker) are joined by newcomers Jean Beauprey, Linda Chisholm, Rose Magers, Kim Ruddins, Tauna Vandeweghe, and Paula Weishoff. All of the women on the squad, with the exception of Kim Ruddins, played on the 1982 team that won the bronze medal at the World Championships. In 1982, the team's starting line-up included Flo Hyman, Rita Crockett, Debbie Green, Sue Woodstra, Laurie Flachmaier, and Paula Weishoff.

#1 Paula Weishoff
Hometown: Torrence, California
Birthdate: May 1, 1962
Height: 6′1″
College: University of Southern California
Position: Middle Blocker

#2 Sue Woodstra
Hometown: Colton, California
Birthdate: May 21, 1957
Height: 5′9″
College: University of Southern California
Position: Hitter/Blocker

#3 Rita Crockett
Hometown: San Antonio Texas
Birthdate: November 2, 1957
Height: 5′8½″
College: University of Houston
Position: Hitter/Blocker

#4 Tauna Vandeweghe
Hometown: Bel Air, California
Birthdate: February 7, 1960
Height: 6′3″
College: University of California, Los Angeles and USC
Position: Middle Blocker

#5 Laura Flachmeier
Hometown: Garland, Texas
Birthdate: January 28, 1957
Height: 6′½″
College: Texas Lutheran College
Position: Hitter/Blocker

#6 Carolyn Becker
Hometown: Norwalk, California
Birthdate: November 8, 1958
Height: 6′0″
College: University of Southern California
Position: Setter

#7 Flo Hyman
Hometown: Inglewood, California
Birthdate: July 29, 1954
Height: 6′5″
College: University of Houston
Position: Hitter/Blocker

#8 Rose Magers
Hometown: Big Springs, Texas
Birthdate: June 25, 1960
Height: 6′2½″
College: University of Houston
Position: Blocker

#9 Julie Vollersten
Hometown: Palmyra, Nebraska
Birthdate: March 18, 1959
Height: 6′½″
College: Orange Coast College
Position: Hitter/Blocker

#10 Debbie Green
Hometown: Westminister, California
Birthdate: June 25, 1958
Height: 5′4″
College: University of Southern California
Position: Setter

#11 Kim Ruddins
Hometown: Los Angeles, California
Height: 5′11″
College: University of Southern California
Position: Setter

#14 Linda Chisholm
Hometown: Van Nuys, California
Birthdate: December 21, 1957
Height: 6′2″
College: Pepperdine University
Position: Right-Side Hitter

#15 Jeanne Beauprey
Hometown: Mission Viejo, California
Birthdate: June 21, 1961
Height: 6′0″
College: University of California, Los Angeles
Position: Right-Side Hitter

result of the brilliant work of Dr. Gideon Ariel, computers are employed in the study of biomechanics (the analysis of human movement). In this process, particular movements are photographed with high-speed cameras and then "digitized." This allows a movement to be programmed into a computer and studied.

"In 1981," Selinger recalls, "we took three cameras to the World Cup in Japan and filmed all of the contests there: China vs. Brazil, China vs. the U.S.A., the U.S.A. vs. Japan, and so on. After the computer had analyzed the data, we were able to isolate certain crucial situations for study. Say the U.S.A. hits the ball against China in a particular spot. How does China respond? For example, at what point did we set the ball at such a height and at such a speed that the Chinese could not close in for the block?

"The computer makes this data immediately available. You know how high the ball was set, how much time you had, how fast the Chinese block moved, and how fast the ball was going. All the information is there."

As a result, Selinger has been able to make subtle alterations to his game plans for specific opponents. Against China, for example, he may install a quicker offense. Against the Soviet Union, he may sacrifice speed for solid defense. The options given to him by the computer are invaluable.

THE GAME'S THE THING

Selinger admits that even if his team *doesn't* win the gold medal in Los Angeles, he will have accomplished the goals he set for himself when he joined the team: to establish a top-notch volleyball program, to promote volleyball in this country, and to bring a higher level of skill to the sport in the U.S.

"In my opinion," Selinger concludes, "the game of volleyball brings out all of the qualities you like to see in an athlete, both physical and mental. It also encompasses many other sports: track & field, gymnastics, and basketball, for example. And there is no more social sport than volleyball, because in volleyball no one person can possess the ball. You are totally dependent on your teammates. This brings out the best in you: the ability to share. To me, it's the perfect game."

DISKREAD

Check those mysterious disk sectors

by MARTIN REX

Atari's Disk Operating System (OS) facilitates the loading and storing of information on a disk drive. With DOS, a disk contains 720 sectors, each of which holds 128 bytes of data. If you've ever wondered what is contained in the sectors on a disk, this program will help satisfy your curiosity. However, due to space limitations, we can't go into detail about the meaning of the data on the disk.

SYNOPSIS

This BASIC program allows you to view and edit the contents of any disk sector, and requires a disk drive and at least 16K RAM. A printer is optional. To use this program on an XL series computer, run Translator first (see page 85 this issue).

Martin Rex lives in West Germany.

HOW TO USE THE PROGRAM

First type in the listing and SAVE a copy for safekeeping. Use TYPO to check for typing errors.

Before using Diskread for the first time, select a disk to examine. Back it up, and use Diskread on the copy only! If there are any typing errors in your version of Diskread, there's a slight possibility that it could destroy valuable data on your disk.

Now RUN the program. You will be asked for a sector to be listed; they are numbered from 1 to 720. Try 361 — this is where the disk directory starts. The disk drive will run for a few seconds, and the contents of the sector will appear on your screen. The left side of the screen represents the data in hexadecimal form. On the right side, the data appears as ASCII characters in inverse video. A menu of choices is listed at the bottom of the screen. Select the desired function by pressing the indicated letter key. (It's not necessary to press [RETURN] after making a selection.)

PROGRAM OPTIONS

F = following sector

This reads and displays the next absolute sector. If you're reading sector 450, you'll see 451.

N = next sector

If a sector is part of a file that was created by DOS, it contains information that indicates the location of the next consecutive sector (if any) in the file. This function uses this pointer to find the next sector in a file, if applicable.

S = new sector

Use this to skip to another sector. Remember, sectors are numbered from 1 to 720.

B = BASIC

This ends the program.

E = edit

If you choose this mode, the cursor will be placed on the first hexadecimal byte in the sector. You can type in new values for any byte, using the cursor keys to position yourself. To exit this mode, press [RETURN].

W = write new sector

If you edit a sector, you can write the new data back to the same location on the disk. You are first asked for a confirmation of the write command. Do not use this feature unless you understand all of the implications of your actions. Otherwise, you can lose all of the data on your disk.

H = hardcopy

Make sure a printer is on-line and ready. This function lists the current sector's contents to your printer.

The short machine-language routine at the end of the program permits the rapid listing of the sector's contents to the screen.

continued on next page

```
1 REM ANTIC MAGAZINE MARCH 1984
2 REM DISKREAD
3 REM BY MARTIN REX
4 REM WEST GERMANY
9 GOSUB 5000:NES=1:EOF=0:GRAPHICS 0
10 DIM CALL$(5),BUF$(129),H$(3),AC$(10),N$(100),X$(3),E$(30),A$(10)
20 ? "                    Diskpage"
25 ? :? "  Place source disk in drive 1."
30 BUF$(1)="":BUF$(129)="":BUF$(2)=BUF$
35 TRAP 60
60 ? "SECTOR to be listed (1-720)";:INPUT NUM:IF NUM<1 OR NUM>720 THEN 60
90 GOSUB 4500:POKE 779,INT(NUM/256):POKE 778,NUM-INT(NUM/256)*256:POKE 769,1:POKE 770,82:V=USR(ADR(CALL$))
100 BUF$(129)=" ":ER=PEEK(771):IF ER<>1 THEN GOSUB 4020:GOTO 300
200 ? "⇱    DRIVE:D0      SECTOR:";NUM
210 X=USR(1536,ADR(BUF$))
220 NE=ASC(BUF$(126,126)):NE1=ASC(BUF$(127,127)):NE=NE-128*(NE>127):NE=NE-64*(NE>63)
230 NE=NE-32*(NE>31):NE=NE-16*(NE>15):NE=NE-8*(NE>7):NE=NE-4*(NE>3)
240 NES=NE*256+NE1
250 IF NES=0 THEN EOF=1
260 ? "NEXT SECTOR:";NES:GOTO 300
270 POSITION 21,18:? "FOLLOWING SEC. F"
275 POSITION 2,19:? "  NEXT SEC. . N   NEW SEC. ..... S"
280 ? "  BASIC ..... B    EDIT SEC. .... E"
290 ? "  HARDCOPY .. H    WRITE NEW SEC. W":? "↑":RETURN
300 GOSUB 270:OPEN #1,4,0,"K:":GET #1,Z:CLOSE #1
310 IF Z=ASC("F") THEN NUM=NUM+1:GOTO 90
320 IF Z=ASC("S") THEN EOF=0:GOTO 30
330 IF Z=ASC("B") THEN GRAPHICS 0:END
340 IF Z=ASC("H") THEN GOSUB 1000
350 IF Z=ASC("E") THEN 2000
360 IF Z=ASC("W") THEN 4000
370 IF Z=ASC("N") THEN 6000
380 REM
390 GOTO 300
700 H=INT(A/16):H$=CHR$(48+H):IF H>9 THEN H$=CHR$(55+H)
710 H=A-H*16:H$(2)=CHR$(48+H):IF H>9 THEN H$(2)=CHR$(55+H)
720 RETURN
1000 LPRINT "    DRIVE:D0     SECTOR:";NUM:LPRINT
1005 N$(1)=CHR$(32):N$(100)=CHR$(32):N$(2)=N$
1010 FOR Y=0 TO 15:A=Y*8:GOSUB 700:N$=H$
1020 FOR X=0 TO 7:A=ASC(BUF$(X+Y*8+1,X+Y*8+1)):GH=A:GOSUB 700:N$(X*3+7)=H$
1030 GH=GH-128*(GH>127):IF GH<32 THEN GH=32
1040 IF GH>124 THEN GH=32
1050 AC$(X+1)=CHR$(GH):NEXT X:N$(36)=AC$:LPRINT N$:NEXT Y:LPRINT :LPRINT :RETURN
2000 X=7:Y=3:OPEN #1,4,0,"K:"
2010 GOSUB 2500
2020 GET #1,W:IF W=155 THEN CLOSE #1:POKE P,WZ:GOTO 200
2030 IF W=28 THEN POKE P,WZ:Y=Y-1*(Y>3):GOTO 2010
2040 IF W=29 THEN POKE P,WZ:Y=Y+1*(Y<18):GOTO 2010
2050 IF W=30 OR W=31 THEN GOSUB 2110:GOTO 2010
2060 IF W<48 OR W>70 THEN 2020
2061 IF W>57 AND W<65 THEN 2020
2070 X$=CHR$(W):POKE P,W-32:X2=X:Y2=Y:X=X+1:GOSUB 2500
2080 GET #1,W:IF W<48 OR W>70 THEN 2080
2081 IF W>57 AND W<65 THEN 2080
2090 X$(2)=CHR$(W):POKE P,W-32:X=X+2:IF X>28 THEN X=7:Y=Y+1:IF Y>18 THEN Y=3:X=7
2100 X1=(X2-7)/3:Y1=Y2-3:P2=Y1*8+X1+1:H$=X$:GOSUB 3000:BUF$(P2,P2)=CHR$(D):? X1:? "↑↑":GOTO 2010
2110 IF W=30 THEN POKE P,WZ:X=X-3:IF X<7 THEN X=28:Y=Y-1:IF Y<3 THEN Y=18:X=28:RETURN
2120 IF W=31 THEN POKE P,WZ:X=X+3:IF X>28 THEN X=7:Y=Y+1:IF Y>18 THEN Y=3:X=7
2130 RETURN
2500 P=PEEK(88)+256*PEEK(89)+(Y-1)*40+X:WZ=PEEK(P):POKE P,WZ+128*(WZ<128):RETURN
3000 I=1:GOSUB 3010:D=D1*16:I=2:GOSUB 3010:D=D+D1:RETURN
3010 D1=ASC(H$(I,I))-48:IF D1>9 THEN D1=D1-7
3020 RETURN
4000 ? "                               ↑":REM 31 spaces before up arrow
4002 ? "WRITE NEW SECTOR ";NUM;"   (Y/N)";:INPUT A$:? "↑↑":IF A$="" THEN 300
4004 IF A$(1,1)<>"Y" THEN 300
4005 GOSUB 4500:POKE 769,1:POKE 770,87:V=USR(ADR(CALL$)):ER=PEEK(771):IF ER=1 THEN 90
4010 GOSUB 4020:GOTO 300
4020 E$="":IF ER=128 THEN E$="BREAK key abort"
4030 IF ER=138 THEN E$="Device timeout"
4040 IF ER=139 THEN E$="Device malfunctions"
4050 IF ER=140 THEN E$="Serial bus input framing"
4060 IF ER=142 THEN E$="Data frame overrun"
4070 IF ER=143 THEN E$="Data frame checksum"
```

```
4080 IF ER=144 THEN E$="Disk write-protected"
4090 IF ER=160 THEN E$="Drive number unknown"
4100 IF ER=163 THEN E$="Unrecoverable system"
4105 REM 34 spaces before up arrow on next line
4110 ? "ERROR -";ER;" ";E$;"↑":FOR I=1 TO 300:NEXT I:? "                                  ↑":RETURN
4500 CALL$="h S":CALL$(4)=CHR$(228):CALL$(5)=CHR$(96)
4510 V=ADR(BUF$):POKE 773,INT(V/256):POKE 772,V-INT(V/256)*256:RETURN
5000 GRAPHICS 18:POSITION 4,4:? #6;"PLEASE WAIT !":POKE 712,216
5005 RESTORE 5010:FOR I=0 TO 141:READ A:POKE 1536+I,A:NEXT I:RESTORE :RETURN

5010 DATA 104,104,133,204,104,133,203,32,113,6,162,0,138,32,123,6,160,2,32,118,6,136,208,250,160,0,177,203,32
5020 DATA 123,6,200,192,8,208,246,160,0,177,203,201,127,176,2,105,128,201,252,176,4,201,159,176,2,169,160,32
5030 DATA 97,6,200,192,8,208,230,165,203,24,105,8,144,2,230,204,133,203,32,113,6,138,24,105,8,170,201,128,208
5040 DATA 181,96,24,105,48,201,58,144,2,105,6,133,209,138,72,152,72,165,209,32,164,246,104,168,104,170,96,169
5050 DATA 155,76,97,6,169,32,76,97,6,72,41,240,74,74,74,74,32,88,6,104,41,15,32,88,6,76,118,6
5090 REM 17 spaces before up arrow on next line
6000 IF EOF=1 THEN ? "END OF FILE !":FOR I=1 TO 300:NEXT I:? "                 ↑":GOTO 300
6010 NUM=NES:GOTO 90
```

TYPO TABLE

Variable checksum = 560581

Line num range		Code	Length
1	- 90	WO	545
100	- 275	BU	518
280	- 390	FF	374
700	- 1040	PG	503
1050	- 2080	NZ	519
2081	- 2500	PW	596
3000	- 4040	JL	537
4050	- 4510	TD	524
5000	- 5040	LH	556
5050	- 6010	OS	242

POKER SOLITAIRE

Twenty-five-card draw

by JERRY WHITE

SYNOPSIS

Poker Solitaire is a computerized card game for one to four players. The program requires 16K RAM cassette and 24K RAM with DOS. It runs on all Atari computers.

This month, instead of the usual tutorial or utility program, let's play some poker. Poker Solitaire actually can be played by more than one player. It has been a favorite among my family and friends, and I hope you'll find it to be as much fun as we do.

We begin by answering a few questions. The program will ask you if you wish to use the time penalty. Until you get used to the game, type "N" for No. There is no need to press [RETURN] after any single-key response. When you use the timer penalty, one point will be deducted from your score for each second you require to complete your turn.

Point values for each type of poker hand will be displayed on the screen. Naturally, better hands are worth the most points. You may want to write down these values, then press the [START] button to continue.

Next, specify the number of players by typing a number from one to four. Finally, you must enter a name for each player. You may use up to seven letters for each name.

A complete game consists of three rounds for each player. The program randomly selects 25 cards from a standard deck, then deals them one at a time. Using the arrow keys (or the joystick), position the cursor in whichever of the 25 boxes you wish to place the card, then confirm your choice by pressing the space bar or the joystick trigger button. Once you have placed the card in a box, you may not change your decision or put any other card in that box.

The object of the game is to create the ten best possible poker hands, five running horizontally, and five running vertically on the screen. I'll leave it up to you to find the best strategy.

Once you have placed all 25 cards on the screen, the program calculates a score for each hand. During each calculation, arrows will point to the hand being evaluated, then the score for that hand will be displayed. A running total will be displayed near the top of the screen. When all players have completed a round, totals for all players will be displayed. The combined total of three rounds is your final score.

What's a good score? My personal high round is 3,590, with a three-round total of 8,460. In general, a round of less than 1,000 is poor, about 1,500 seems to be average, over 2,000 is quite good, and over 3,000 is excellent.

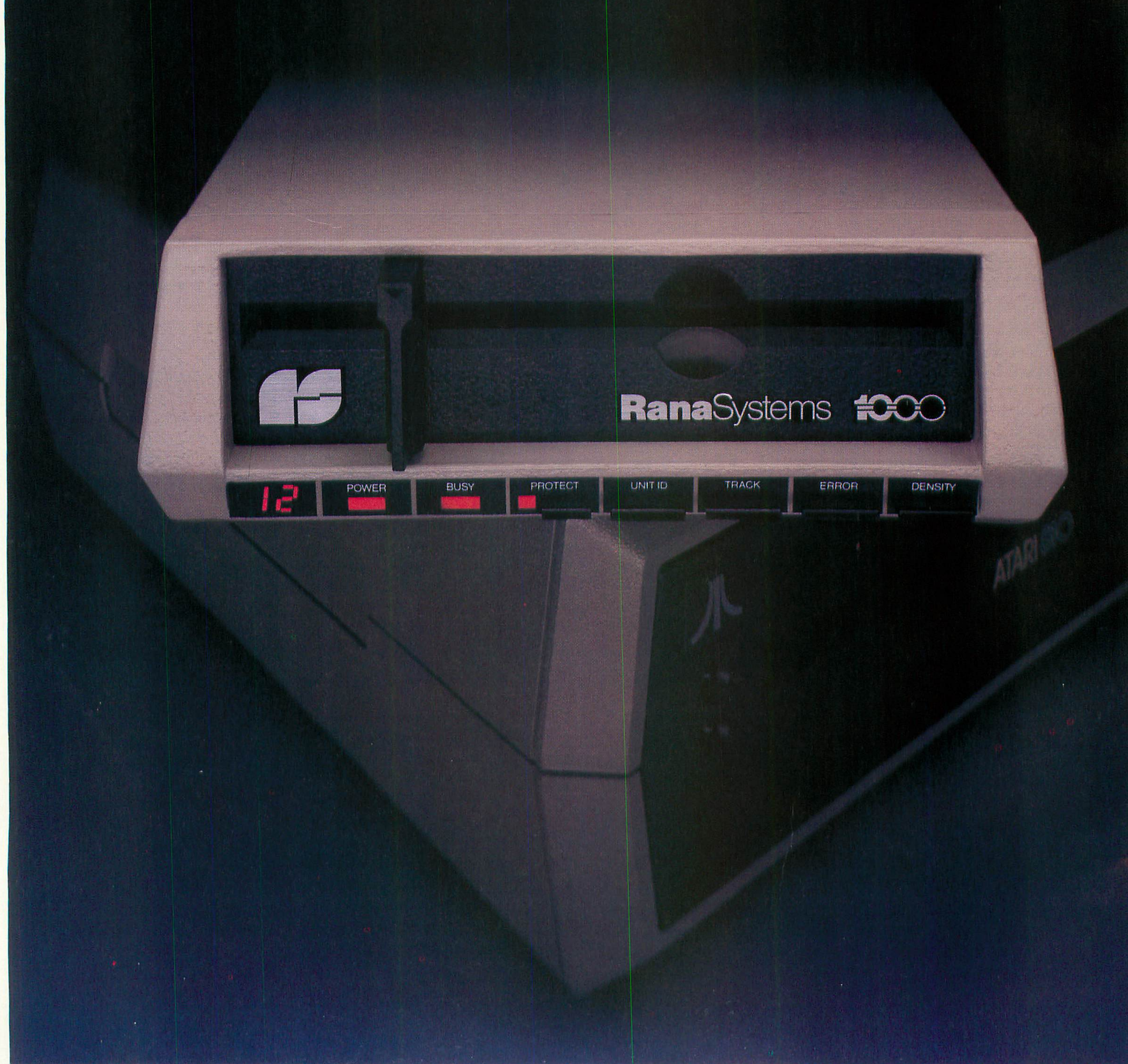
Once you get used to this game, you may wish it would deal the cards and calculate a bit faster. The version that I play is much faster. I compiled this program using the ABC BASIC Compiler from Monarch Data Systems, and it made quite a difference. If you have ABC, by all means compile this program. It will compile perfectly with no changes to the BASIC program. If you want a copy of my compiled version on disk, which requires 24K, send $10 to me at 18 Hickory Lane, Levittown, NY 11756.

```
10 REM ANTIC MAGAZINE MARCH 1984
11 REM POKER SOLITAIRE
12 REM BY JERRY WHITE
28 GOSUB 19000:FOR GAME=I TO N3:FOR PL
R=I TO N4:SCORE(PLR,GAME)=0:NEXT PLR:N
EXT GAME:GOTO 2000
31 GOSUB N40:GOTO 2000
34 FOR ME=0 TO N3:SOUND ME,0,ME,N2:NEX
T ME
35 FOR ME=0 TO N3:SOUND ME,0,0,0:NEXT
ME:RETURN
40 GRAPHICS 0:POKE N16,64:POKE 53774,1
12:POKE 82,N2:POKE 83,39:? :POSITION N
2,0
```

```
41 C=INT(PEEK(53770)/N16):SETCOLOR I,C
,N13:SETCOLOR N2,C,O:SETCOLOR N4,C,O:P
OKE CUR,I:RETURN
45 JIF=I:FOR JW=N14 TO 0 STEP -N2:SOUN
D 0,P,N10,JW:SOUND I,P+I,N10,JW:GOSUB
WAIT:NEXT JW:RETURN
50 JIF=N3:FOR BLINK=I TO N3:POKE 755,N
3:GOSUB WAIT:POKE 755,N2:GOSUB WAIT:NE
XT BLINK:RETURN
60 GOSUB 34:POKE 764,N255:GOSUB 34:CLO
SE #I:OPEN #I,N4,K,"K:":GET #I,KEY:KEY
=KEY-48:CLOSE #I:RETURN
70 X=N5:Y=N7:POSITION X,Y:POKE CUR,0:?
 " ";:RETURN
75 POKE CUR,I:POSITION N11,N4:? "TOTAL
 POINTS= ";TP:RETURN
90 P=0:POKE 82,N2:POKE 83,39:GOSUB N40
:IF BS>0 THEN POSITION N10,N2:? "SCORE
 TO BEAT= ";BS;
100 POSITION N11,0:? " POKER SOLITAIRE
 "
105 L1$="┌─────┬─────┬─────┬─────┬─────
─┐":L2$="|     |     |     |     |
 |"
110 L3$="├─────┼─────┼─────┼─────┼─────
─┤":L4$="└─────┴─────┴─────┴─────┴─────
─┘"
120 POSITION N4,N6:? L1$:POSITION N4,N
7:? L2$:POSITION N4,N8:? L2$:POSITION
N4,N9:? L3$
125 POSITION N4,N10:? L2$:POSITION N4,
N11:? L2$:POSITION N4,N12:? L3$:POSITI
ON N4,N13:? L2$
130 POSITION N4,N14:? L2$:POSITION N4,
N15:? L3$:POSITION N4,N16:? L2$:POSITI
ON N4,N17:? L2$
135 POSITION N4,N18:? L3$:POSITION N4,
N19:? L2$:POSITION N4,N20:? L2$:POSITI
ON N4,N21:? L4$
140 P=N100:GOSUB N45:GOSUB N50
160 IF TIME=I THEN GOSUB 2300
220 FOR CARD=I TO N25:CARD$=HAND$(N4*C
ARD-N3,N4*CARD):POSITION N10,N4:? BL$;
BL$:POKE 77,0
240 POSITION N14,N4:? "CARD #";CARD;"
";CARD$(I,N2);:IF CARD$(N2,N2)<>S1$ TH
EN ? S1$;
250 ? CARD$(N4,N4);:POSITION N3,N23:?
" TRIGGER OR SPACE TO PLACE CARD ";
260 X=N5:Y=N7:POSITION X,Y:POKE CUR,0:
? " ";:GOSUB N50
300 POKE LKEY,N255
310 IF PEEK(LKEY)=N14 AND Y>N7 THEN Y=
Y-N3:POKE LKEY,N255:GOTO N400
320 IF STICK(0)=N14 AND Y>N7 THEN Y=Y-
N3:GOTO N400
330 IF PEEK(LKEY)=N15 AND Y<N18 THEN Y
=Y+N3:POKE LKEY,N255:GOTO N400
340 IF STICK(0)=N13 AND Y<N18 THEN Y=Y
+N3:GOTO N400
350 IF PEEK(LKEY)=N6 AND X>N5 THEN X=X
-N6:POKE LKEY,N255:GOTO N400
360 IF STICK(0)=N11 AND X>N5 THEN X=X-
N6:GOTO N400
370 IF PEEK(LKEY)=N7 AND X<N26 THEN X=
X+N6:POKE LKEY,N255:GOTO N400
380 IF STICK(0)=N7 AND X<N26 THEN X=X+
N6:GOTO N400
385 IF  NOT STRIG(0) THEN GOSUB 30006:
GOTO 388
386 IF PEEK(LKEY)=33 THEN 388
387 GOTO 310
388 IF  NOT PEEK(93) THEN POKE CUR,I:?
 CARD$(I,N2);:X=X+N3:Y=Y+I:POSITION X,
Y:? CARD$(N4,N4);:GOTO 450
389 POKE DFLG,0:POKE CUR,I:? CHR$(253)
:POKE DFLG,I:GOTO 260
390 GOTO 310
400 POSITION X,Y:? " ";:GOSUB 34
410 JIF=N20:GOSUB WAIT:GOTO 385
450 POKE CUR,I:POSITION N3,N23:? BL$;B
L$;BL$;B5$;:IF Y>N8 THEN 466
461 IF X=N8 THEN PN(I)=HN(CARD):PS(I)=
HS(CARD):GOTO N490
462 IF X=N14 THEN PN(N2)=HN(CARD):PS(N
2)=HS(CARD):GOTO N490
463 IF X=N20 THEN PN(N3)=HN(CARD):PS(N
3)=HS(CARD):GOTO N490
464 IF X=N26 THEN PN(N4)=HN(CARD):PS(N
4)=HS(CARD):GOTO N490
465 PN(N5)=HN(CARD):PS(N5)=HS(CARD):GO
TO N490
466 IF Y>N11 THEN 472
467 IF X=N8 THEN PN(N6)=HN(CARD):PS(N6
)=HS(CARD):GOTO N490
468 IF X=N14 THEN PN(N7)=HN(CARD):PS(N
7)=HS(CARD):GOTO N490
469 IF X=N20 THEN PN(N8)=HN(CARD):PS(N
8)=HS(CARD):GOTO N490
470 IF X=N26 THEN PN(N9)=HN(CARD):PS(N
9)=HS(CARD):GOTO N490
471 PN(N10)=HN(CARD):PS(N10)=HS(CARD):
GOTO N490
472 IF Y>N14 THEN 478
473 IF X=N8 THEN PN(N11)=HN(CARD):PS(1
1)=HS(CARD):GOTO N490
474 IF X=N14 THEN PN(N12)=HN(CARD):PS(
N12)=HS(CARD):GOTO N490
475 IF X=N20 THEN PN(N13)=HN(CARD):PS(
N13)=HS(CARD):GOTO N490
476 IF X=N26 THEN PN(N14)=HN(CARD):PS(
N14)=HS(CARD):GOTO N490
477 PN(N15)=HN(CARD):PS(N15)=HS(CARD):
GOTO N490
478 IF Y>N17 THEN 485
479 IF X=N8 THEN PN(N16)=HN(CARD):PS(N
16)=HS(CARD):GOTO N490
480 IF X=N14 THEN PN(N17)=HN(CARD):PS(
N17)=HS(CARD):GOTO N490
481 IF X=N20 THEN PN(N18)=HN(CARD):PS(
N18)=HS(CARD):GOTO N490
482 IF X=N26 THEN PN(N19)=HN(CARD):PS(
N19)=HS(CARD):GOTO N490
483 PN(N20)=HN(CARD):PS(N20)=HS(CARD):
GOTO N490
485 IF X=N8 THEN PN(N21)=HN(CARD):PS(N
21)=HS(CARD):GOTO N490
```

continued on page 72

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486 IF X=N14 THEN PN(N22)=HN(CARD):PS(N22)=HS(CARD):GOTO N490
487 IF X=N20 THEN PN(N23)=HN(CARD):PS(N23)=HS(CARD):GOTO N490
488 IF X=N26 THEN PN(N24)=HN(CARD):PS(N24)=HS(CARD):GOTO N490
489 PN(N25)=HN(CARD):PS(N25)=HS(CARD):GOTO N490
490 GOSUB N50:P=N250-(N8*CARD):GOSUB N45:GOSUB 70:NEXT CARD
500 P=0:TP=0:POKE DFLG,I:IF TIME=0 THEN 505
502 GOSUB 2400:POKE CUR,I:POSITION N11,0:? "TIME= ";N;" SECONDS  "
505 POSITION N3,N7:? "⊟";:POSITION N35,N7:? "⊟";:GOSUB N50
510 FOR ME=I TO N5:CN(ME)=PN(ME):CS(ME)=PS(ME):NEXT ME:GOSUB N5000:GOSUB N75
515 POSITION N3,N7:? " ";:POSITION N35,N7:? P;:P=0:GOSUB N50:POSITION N3,N10:? "⊟";:POSITION N35,N10:? "⊟";
520 FOR ME=N6 TO N10:CN(ME-N5)=PN(ME):CS(ME-N5)=PS(ME):NEXT ME:GOSUB N5000:GOSUB N75
525 POSITION N3,N10:? " ";:POSITION N35,N10:? P;:P=0:GOSUB N50:POSITION N3,N13:? "⊟";:POSITION N35,N13:? "⊟";
530 FOR ME=N11 TO N15:CN(ME-N10)=PN(ME):CS(ME-N10)=PS(ME):NEXT ME:GOSUB N5000:GOSUB N75
535 POSITION N3,N13:? " ";:POSITION N35,N13:? P;:P=0:GOSUB N50:POSITION N3,N16:? "⊟";:POSITION N35,N16:? "⊟";
540 FOR ME=N16 TO N20:CN(ME-N15)=PN(ME):CS(ME-N15)=PS(ME):NEXT ME:GOSUB N5000:GOSUB N75
545 POSITION N3,N16:? " ";:POSITION N35,N16:? P;:P=0:GOSUB N50:POSITION N3,N19:? "⊟";:POSITION N35,N19:? "⊟";
550 FOR ME=N21 TO N25:CN(ME-N20)=PN(ME):CS(ME-N20)=PS(ME):NEXT ME:GOSUB N5000:GOSUB N75
555 POSITION N3,N19:? " ";:POSITION N35,N19:? P;:P=0:GOSUB N50:POSITION N7,N5:? "⍗";:POSITION N7,N22:? "⍐";
560 J=0:FOR ME=I TO N21 STEP N5:J=J+I:CN(J)=PN(ME):CS(J)=PS(ME):NEXT ME:GOSUB N5000:GOSUB N75
565 POSITION N7,N5:? " ";:POSITION N6,N22:? P;" ";:P=0:GOSUB N50:POSITION N13,N5:? "⍗";:POSITION N13,N22:? "⍐";
570 J=0:FOR ME=N2 TO N22 STEP N5:J=J+I:CN(J)=PN(ME):CS(J)=PS(ME):NEXT ME:GOSUB N5000:GOSUB N75
575 POSITION N13,N5:? " ";:POSITION N12,N22:? P;" ";:P=0:GOSUB N50:POSITION N19,N5:? "⍗";:POSITION N19,N22:? "⍐";
580 J=0:FOR ME=N3 TO N23 STEP N5:J=J+I:CN(J)=PN(ME):CS(J)=PS(ME):NEXT ME:GOSUB N5000:GOSUB N75
585 POSITION N19,N5:? " ";:POSITION N18,N22:? P;" ";:P=0:GOSUB N50:POSITION N25,N5:? "⍗";:POSITION N25,N22:? "⍐";
590 J=0:FOR ME=N4 TO N24 STEP N5:J=J+I:CN(J)=PN(ME):CS(J)=PS(ME):NEXT ME:GOSUB N5000:GOSUB N75
595 POSITION N25,N5:? " ";:POSITION N25,N22:? P;" ";:P=0:GOSUB N50:POSITION N31,N5:? "⍗";:POSITION N31,N22:? "⍐";
600 J=0:FOR ME=N5 TO N25 STEP N5:J=J+I:CN(J)=PN(ME):CS(J)=PS(ME):NEXT ME:GOSUB N5000:GOSUB N75
605 POSITION N31,N5:? " ";:POSITION N31,N22:? P;" ";:P=0:GOSUB N50:IF TIME=0 THEN 680
615 POSITION N11,0:? " SOLITAIRE POKER "
620 POSITION N11,N4:? BL$;BL$;:POSITION N10,N2:? "  POINTS SCORED= ";TP;B5$;
622 JIFFY=N60:GOSUB WAIT:POSITION N11,N3:? "MINUS TIME PENALTY";:? BL$;
632 GOSUB WAIT:TP=TP-N:POSITION N11,N4:? " TOTAL POINTS= ";TP;BL$;:IF TP>BS THEN BS=TP
650 GOTO 690
680 IF TP>BS THEN BS=TP
690 POSITION N4,N23:? " TRIGGER OR SPACE TO CONTINUE ";
692 IF  NOT STRIG(0) THEN SCORE(PLR,GAME)=TP:GOSUB 30006:GOTO 696
693 IF PEEK(LKEY)=33 THEN SCORE(PLR,GAME)=TP:POKE LKEY,N255:GOTO 696
694 GOTO 692
696 TP=0:P=N250:GOSUB N45:NEXT PLR:GOTO 800
800 GOSUB N40:? :? ," S C O R E S ":POSITION N7,N3:? NA$(I,N8):IF KEY>I THEN POSITION N15,N3:? NA$(N11,N18)
804 IF KEY>N2 THEN POSITION N23,N3:? NA$(N21,28)
805 IF KEY>N3 THEN POSITION N31,N3:? NA$(N31,38)
810 POSITION I,N4:? "PLAYER  (1)      (2)      (3)      (4)    ":POSITION I,N7:? "GAME1":POSITION I,N10:? "GAME2"
814 POSITION I,N13:? "GAME3":POSITION I,N17:? "TOTAL":FOR ME=I TO N3:FOR YOU=I TO N4
825 IF  NOT SCORE(YOU,ME) THEN SC$=" ":LS=N3:GOTO 840
830 SC$=STR$(SCORE(YOU,ME)):LS=LEN(SC$)
840 PX=(YOU*N8)+N4:PX=PX-LS:PY=(ME*N3)+N4:POSITION PX,PY:? SC$;:NEXT YOU:NEXT ME:PS=0:FOR ME=I TO N4
862 FOR YOU=I TO N3:PS=PS+SCORE(ME,YOU):NEXT YOU:IF  NOT PS THEN SC$="    ":LS=N3:GOTO 872
870 SC$=STR$(PS):LS=LEN(SC$):PS=0
872 PX=(ME*N8)+N4:PX=PX-LS:POSITION PX,N17:? SC$:NEXT ME
880 POSITION N4,N20:? " TRIGGER OR SPACE TO CONTINUE ";:GOSUB N50:P=N255:GOSUB N45
882 IF  NOT STRIG(0) THEN GOSUB 30006:GOTO 900
```

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883 IF PEEK(LKEY)=33 THEN POKE LKEY,N255:GOTO 900
884 GOTO 882
900 NEXT GAME:JIF=N60:? :? "BASIC":? "IS";:END
1000 FOR Q=0 TO N52:L(Q)=Q:NEXT Q:FOR PY=N16 TO N22:POSITION N17,PY:? "          ";:NEXT PY
1002 POSITION N18,N18:? "CARD";:HAND$="":FOR C=I TO N25:POSITION N19,N20:? C;
1200 Q=INT(PEEK(53770)/5):XX=L(Q):GOSUB 10700:IF XX<0 THEN 1200
1240 L(Q)=-I:S=INT(XX/N13):V=XX-N13*S:IF S>0 THEN 1290
1270 S$="♣":GOTO N1360
1290 IF S>I THEN 1320
1300 S$="♦":GOTO N1360
1320 IF S>N2 THEN 1350
1330 S$="♥":GOTO N1360
1350 S$="♠":GOSUB 10720
1360 IF V>N8 THEN 1390
1370 C$=STR$(V+N2):GOTO N1490
1390 IF V>N9 THEN 1420
1400 C$="J":GOTO N1490
1420 IF V>N10 THEN 1450
1430 C$="Q":GOTO N1490
1450 IF V>N11 THEN 1480
1460 C$="K":GOTO N1490
1480 C$="A"
1490 IF LEN(C$)=I THEN SP$=S2$
1491 GOSUB 34:IF LEN(C$)=N2 THEN SP$=S1$
1495 HAND$(LEN(HAND$)+I)=C$:HAND$(LEN(HAND$)+I)=SP$:HAND$(LEN(HAND$)+I)=S$:HN(C)=V:HS(C)=S:NEXT C:RETURN
2000 FOR ME=I TO N3:P=N100:GOSUB N45:P=N200:GOSUB N45:NEXT ME
2020 GRAPHICS N2:GOSUB 30010
2040 ? #N6:? #N6:? #N6;"  use time penalty?":? #N6:? #N6:? #N6;"        Y OR N"
2060 GOSUB N60:IF KEY=41 THEN TIME=I:GOTO 2500
2080 IF KEY=30 THEN TIME=0:GOTO 2500
2100 GOTO 2060
2300 FOR Z=N18 TO N20:POKE Z,0:NEXT Z:RETURN
2400 N=0:FOR Z=N18 TO N20:N=N*256+PEEK(Z):NEXT Z:N=INT(N/N60):RETURN
2500 GRAPHICS N17:GOSUB 30010
2510 ? #N6:? #N6;"     HAND VALUES":? #N6:? #N6:? #N6;"1000 straight flush":? #N6:? #N6;" 750 four of a kind"
2540 ? #N6:? #N6;" 500 full house":? #N6:? #N6;" 300 flush"
2560 ? #N6:? #N6;" 200 straight":? #N6:? #N6;" 100 three of a kind"
2580 ? #N6;"  50 two pair":? #N6:? #N6;"  20 one pair"
2600 POSITION N5,N22:? #N6;"press START":IF PEEK(BUTN)=N6 THEN 3000
2640 POSITION N5,N22:? #N6;"PRESS start":GOTO 2600
3000 GOSUB N40:GOSUB 34:GOTO 10000
5000 FOR CV=0 TO N12:NO(CV)=0:NEXT CV:POKE CUR,I:POSITION N10,N23:? " CALCULATING ";
5100 FOR C=I TO N5:FOR CV=0 TO N12:IF CN(C)=CV THEN NO(CV)=NO(CV)+I
5140 NEXT CV:NEXT C:FOR CV=0 TO N12:IF NO(CV)<N2 THEN 5300
5240 IF NO(CV)=N2 THEN P=P+N20:ST=N9
5260 IF NO(CV)=N3 THEN P=P+N100:ST=N9:FH=CV
5280 IF NO(CV)=N4 THEN P=P+750:ST=N9
5300 IF ST=N9 THEN 5400
5310 IF NO(CV)=0 AND ST<>0 AND ST<>N5 THEN ST=N9
5320 IF NO(CV)=I THEN ST=ST+I
5400 NEXT CV:IF NO(0)=I AND NO(I)=I AND NO(N2)=I AND NO(N3)=I AND NO(N12)=I THEN ST=N5
5420 IF ST=N5 THEN P=P+N200:GOSUB 9000
5500 IF P=120 THEN P=500:GOTO 5800
5600 IF P=N1000 THEN 5800
5700 GOSUB 9000
5800 POKE CUR,I:POSITION N10,N23:? " CALCULATING     ";:IF P=N40 THEN P=N50
5900 IF  NOT P THEN FOR JW=N15 TO 0 STEP -I:SOUND 0,13,N4,JW:NEXT JW:GOTO 5990
5910 JIF=I:IF P<500 THEN FOR JW=N15 TO 0 STEP -I:SOUND 0,N200-P/N2,N10,JW:GOSUB WAIT:NEXT JW:GOTO 5990
5920 FOR JW=N200 TO 0 STEP -I:SOUND 0,JW,N10,N10:SOUND I,JW+I,N10,N10:NEXT JW:GOSUB 35
5990 TP=TP+P:ST=0:RETURN
9000 FOR ME=I TO N4:IF CS(ME)<>CS(ME+I) THEN 9200
9020 NEXT ME:IF P=N200 THEN P=N1000:RETURN
9100 P=300:RETURN
9200 POP :RETURN
10000 GOSUB N40:POKE CUR,0:? :? "HOW MANY PLAYERS (1-4)?";:GOSUB N60
10010 IF KEY<I OR KEY>N4 THEN 10000
10011 ? KEY:?
10012 ? :? :? " TYPE NAMES OF 7 LETTERS OR LESS ":? :JIF=N30:GOSUB WAIT:FOR NA=I TO KEY
10016 ? :? "TYPE THE NAME OF PLAYER ";NA;:POKE 764,N255:INPUT PN$
10018 IF LEN(PN$)>N7 OR PN$="" THEN P=N255:GOSUB N45:PN$="":GOTO 10016
10020 NA$(LEN(NA$)+I)=PN$:LPN=LEN(PN$):FOR PAD=(NA*N10)-(N10-LPN) TO NA*N10-I:NA$(LEN(NA$)+I)=" ":NEXT PAD:NEXT NA
10050 FOR GAME=I TO N3:FOR PLR=I TO KEY:GOSUB N40:HAND$="":POKE CUR,I:? :? :? "        ▣♦♣♠♣♥▣"
10120 ? "        ▣-------▣":? "     |◸◹ ◸◹|":? "  ▣ ♥  ♥□":? "        ▣  |  □"
```

continued on next page

```
10170 ? "           |  ▣  |":? "
         | ▣▣▣ |"
10180 ? "              ▣▣▣▣▣▣▣":? "
        ▣▣▣▣▣▣▣ ▣▣▣▣▣▣▣"
10210 ? "     |    ▣▣▣     |":?
"      | |       |"
10230 ? "      I'M DEALING TO ";NA$(
PLR*N10-N9,PLR*N10-N3):GOSUB N1000
10250 FOR PY=N16 TO N22:POSITION N17,P
Y:? "     ";:NEXT PY
10300 POSITION N15,N18:? " GOOD LUCK "
:POSITION N18,N5:? " ▣ ▣";
10500 FOR ME=I TO N20:GOSUB 10750:GOSU
B 10770:NEXT ME:POSITION N18,N5:? "▣
▣ ";
10520 FOR ME=N250 TO 0 STEP -N10:SOUND
 0,ME,N10,N8:NEXT ME:SOUND 0,0,0,0:GOT
O 90
10700 POSITION N18,N5:? " ▣  ▣";:RETUR
N
10720 POSITION N18,N5:? "▣  ▣ ";:RETUR
N
10750 POSITION N20,N11:? "▣":POSITION
N20,N11:? "X":RETURN
10770 POSITION N20,N11:? "X":POSITION
N20,N11:? "▣":RETURN
19000 N6=6:GRAPHICS 2:POKE 752,1:? "▣"
;:GOSUB 30010
19010 ? #N6:? #N6:? #N6;"        poker
":? #N6;"    solitaire"
19015 ? #N6:? #N6;"      (C) 1983"
19020 ? #N6:? #N6;"by jerry white"
20000 READ I,N2,N3,N4,N5,N6,N7,N8,N9,N
10,N11,N12,N13,N14,N15,N16,N17,N18,N19
,N20
20010 READ N21,N22,N23,N24,N25,N26,N31
,N35,N40,N45,N50,N52,N60,N75,N100,N200
,N250
20020 READ N255,N400,N490,N1000,N1360,
N1490,N5000,CUR,LKEY,DFLG,BUTN,WAIT
20100 DATA 1,2,3,4,5,6,7,8,9,10,11,12,
13,14,15,16,17,18,19,20
20110 DATA 21,22,23,24,25,26,31,35,40,
45,50,52,60,75,100,200,250
20120 DATA 255,400,490,1000,1360,1490,
5000,752,764,766,53279,30000
21000 DIM L1$(N40),L2$(N40),L3$(N40),L
4$(N40),L(N52),HAND$(N100)
21010 DIM S1$(I),S2$(N2),C$(N2),S$(I),
SP$(N2),CARD$(N4),NO(N12),NA$(N40)
21020 DIM HN(N26),HS(N26),PN(N26),PS(N
26),CN(N5),CS(N5),CV(N12),SCORE(N4,N3)
,SC$(N4),PN$(N10)
21030 SP$="":S1$=" ":S2$="  ":HAND$=""
:C$="":NA$="":PN$=""
21040 DIM BL$(N10),B5$(N5):BL$="
   ":B5$="     ":SC$="    "
21050 FOR GAME=I TO N3:FOR PLR=I TO N4
:SCORE(PLR,GAME)=0:NEXT PLR:NEXT GAME
22000 JIF=N100:GOSUB WAIT:RETURN
30000 POKE 540,JIF
30002 IF PEEK(540) THEN 30002
30004 RETURN
30006 IF  NOT STRIG(0) THEN 30006
30008 RETURN
30010 POKE 708,29:POKE 709,158:POKE 71
0,146:POKE 711,15:POKE 712,146
30012 POKE 16,64:POKE 53774,112:POKE 8
2,2:POKE 83,39:RETURN
```

TYPO TABLE

Variable checksum = 6667528

Line num range		Code	Length
10	- 60	PY	524
70	- 135	HK	515
140	- 350	JF	400
360	- 450	RE	381
461	- 472	TK	392
473	- 485	OT	418
486	- 525	XD	522
530	- 570	PG	535
575	- 620	VO	525
622	- 805	TQ	437
810	- 883	LO	514
884	- 1350	VU	359
1360	- 1495	TD	258
2000	- 2560	IX	514
2580	- 5310	EY	437
5320	- 9000	YX	437
9020	- 10120	BL	547
10170	- 10770	RU	511
19000	- 21000	FL	504
21010	- 30010	ZZ	429
30012	- 30012	DR	78

6502 DISASSEMBLER

by JOHN MATTES

This article describes a Forth program to disassemble 6502 machine code instructions. Using it, you can get a listing of assembler mnemonics to help you figure out how programs written by others are put together. This is one of the best ways of improving your programming skills.

The article is divided into two parts. The first part provides some background information on the 6502 instruction set, to help you understand how the disassembler works. It is not necessary to read this part to get the disassembler working, but it will help you to understand the output. The second part describes the program itelf and gives a sample result from running it.

Machine instructions can contain up to three bytes, the first of which is the operation code (telling the machine what to do), and the remainder give the operand or its address. These "address" bytes can be interpreted in one of several different ways, depending on the "addressing mode."

Imagine that we are considering an instruction with opcode "OP" and the next two bytes contain the two hex numbers AB and CD, respectively (remember that each 8-bit byte contains 2 hex numbers):

: O	P :	A	B :	C	D :

The "Table of Address Modes" lists the various 6502 addressing modes and describes how the hex numbers ABCD following the opcode are to be interpreted.

In the 6502, absolute addresses require two bytes and the most significant digits of the address are stored in the byte with the highest address. That is why the absolute addresses are shown as CDAB. The notation (X) indicates "the contents of the X register." In this notation (OOAB) + (X) indicates "the contents of the memory byte at address OOAB plus the contents of the X register. A comma is used to separate the high and low bytes of an address where clarity requires.

All multiple address mode instructions in the 6502 instruction set can be used in the absolute address mode. The numerical "mode number" shown in the Table of Address Modes is the difference between an instruction's absolute address opcode and its "mode" opcode (plus hex 10 to avoid negative mode numbers).

A table of the absolute address opcodes (+ 10) for the various multiple address instructions, called MULTIMODE, is included in screen 30. Given an arbitrary opcode (say 65) we can find the first entry in MULTIMODE which exceeds the opcode (7D in this case) and subtract to get the mode number (08, corresponding to Zero Page, X). The mnemonic can be read as ADC from the ninth entry in MULTINAME (7D is the ninth entry in MULTIMODE).

The 22 entries in MULTIMODE account for 117 of the 151 valid 6502 opcodes (out of a maximum of 256 possible). The remaining 34 opcodes each identify a single address mode instruction and are dealt with by looking up tables called ONEMODE and ONENAME. These tables also include ten, renegade, multiple-address opcodes that, for reasons best known to the 6502 designers, don't result in correct mode number. The most irregular instruction is LDX, where only two of its five address modes fit the pattern. That is why LDX appears three times in ONENAME.

Given an arbitrary opcode, the first step in the disassembly process is to check the list of single address mode opcodes.

continued on next page

John Mattes, from Sydney, Australia, is an electrical engineer who has worked in telecommunications for 20 years. He says he is "absorbed" in using Forth with his Atari 800.

DESCRIPTION OF DISASSEMBLER

Step	Stack		Instruction	Comment
	OPadd	(2)		Address of current opcode
1			POINTER !	Store OPadd in POINTER
3			CR	Start a new line.
4			BEGIN CR	Start a loop with a new line.
6	OPadd	(11)	POINTER @	Fetch the opcode address.
7	OPadd	(9)	DUP	
8	O	(9)	O	Print the address (double precision -
9			D.	to avoid negative addresses!).
10			2 SPACES	Leave 2 spaces.
11	OP	(14)	C@	Fetch the opcode.
12	OMad	(14)	' ONEMODE	Calculate the start address for - ONEMODE table.
13	2D	(14)	2D	ONEMODE is 2D (45) entries long.
14	I	(20)(27)	SEARCH	For OP in ONEMODE table. Leave -
	f	(15)		Index and flag.
15			IF	Test f. False part starts Step 26.
16	I	(18)	DUP	TRUE part (f=1), i.e., OP in ONEMODE table.
17	ONad	(18)	' ONENAME	Start address for ONENAME table.
18			PRINTNAME	Type the mnemonic
20	2I+1	(23)	2 * 1 +	
22	OMad	(23)	' ONEMODE	Start address of ONEMODE table.
23	OMad+2I+1	(24)	+	Address of MODE for entry I.
24	MODE	(25)	C@	Fetch MODE.
25	MODE/4	(41)	4 /	True part jumps to Step 38.
26			ELSE	FALSE part OP not in ONEMODE
27			DROP	The index left by SEARCH (Step 14).
28	OP		POINTER @ c @	Prepare to search MULTIMODE -
29	MMad		' MULTIMODE	table for opcode. Table is
30	16		16	16 (hex) entries long.
31	I	(32)	SEARCH	For OP. Leave Index and flag.
	f	(32)		f is not used in this case
32	J	(33)	CHKMODE	Check whether MODE for entry -
	MODE/4	(33)		I in MULTIMODE table is -
33	J	(34)	CHKMODE	divisible by 4. If it is -
	MODE/4	(34)		return J = I otherwise J = I + 1.
34	J	(35)	CHKMODE	It may be necessary to -
	MODE/4	(41)		increment I twice (3 CHKMODEs).
35	J	(37)	SWAP	
36	MNad	(37)	' MULTINAME	Start address for MULTINAME table
37			PRINTNAME	type the mnemonic
38			ENDIF	terminates the IF at line 15.
39	MODE/4	(40)	DUP	
40			PRINTMODE	Print address mode mnemonics
41	f	(43)	PRINTADD	Print the address part of the - instruction and update the - pointer. f = 1 indicates a - jump instruction (finish).
42	f	(43)	?TERMINAL	f = 1 indicates a key is - pressed (finish).
43	f	(44)	OR	
44			UNTIL	Jump to BEGIN (step 4) if f = 0
45			;	END

If the wanted opcode is present, the instruction type is known immediately. If not, the list of multiple mode opcodes is used to determine both the instruction type and the addressing mode.

Now for the disassembler program itself. The listing appears in screens 30 to 35. As is usual in Forth listings, the interesting part of the program appears last. The first few screens contain the building blocks from which the main program, called "DISASSEMBLE," or "DIS" for short, is constructed.

Before describing how DISASSEMBLE works, I shall define what each of the words used in the program does.

POINTER — A variable containing the address of the current opcode.

ONEMODE — A table containing the opcodes of those instructions which have only one addressing mode. Each entry consists of two bytes; the first byte gives the mode number and the second is the opcode.

STRING — Compile the following text stream into the dictionary.

ONENAME — A table containing the mnemonics of those instructions which have only one addressing mode.

MULTIMODE — A table of base codes for those instructions which have multiple address modes. The "base code" for an instruction is its absolute mode opcode plus hex 10.

MULTINAME — A table containing the mnemonics of those instructions which have multiple address modes.

MODE — A table containing mnemonics describing the various addressing modes.

LENGTH — A table giving the number of bytes which follow the opcode for the various addressing modes.

SEARCH — OP add len — — I f
Searches a table of two-byte words of length "len" beginning at address "add" for a match to the single byte OP. The table must be arranged in ascending order; I is the index number of the first table entry, which is equal to OP (f = 1) or exceeds OP (f = 0).

PRINTNAME — I add — —
Prints three characters (i.e., instruction mnemonic) beginning at address add + 3*I.

PRINTMODE — MODE/4 — —
Print the two-character mnemonic corresponding to the addressing mode "MODE".

PRINTADD — MODE/4 — — f
Prints the one- or two-byte "address" (if one exists) following the opcode. Sets f to 1 (to terminate disassembly) if the opcode is one of five instructions which can cause a jump.

CHKMODE — I X — — J MODE/4
Calculates the address mode of the current opcode against the Ith base code in the MULTIMODE table and checks whether this is modulo four (i.e., divisible by four with no remainder), if so, J = I,otherwise J = I + 1.

DISASSEMBLE — add — —
Disassembles the code beginning at address "add".

DIS — A synonym for DISASSEMBLE.

Armed with the definitions of the "building blocks," we can now analyze the "main program." I have found the coding form used in the box headed "Description of Disassemble" useful for both analyzing and writing Forth code. The first column is an instruction number (for reference); the second, the contents of the stack; and the third, the instruction (Forth word). The number against a stack entry indentifies the instruction removing that entry from the stack.

You can use a form like the one I have just described to analyze the remaining code. Of course, you will need to know Forth or have in front of you the fig-Forth glossary. Finally, here is an example of using the disassembler to see how the Forth word C@ replaces an address on the stack with the contents of that address.

The process is started by entering ' C@ DIS [RETURN]. This sequence puts the parameter field address of C@ on the stack and starts disassembly. The result looks like:

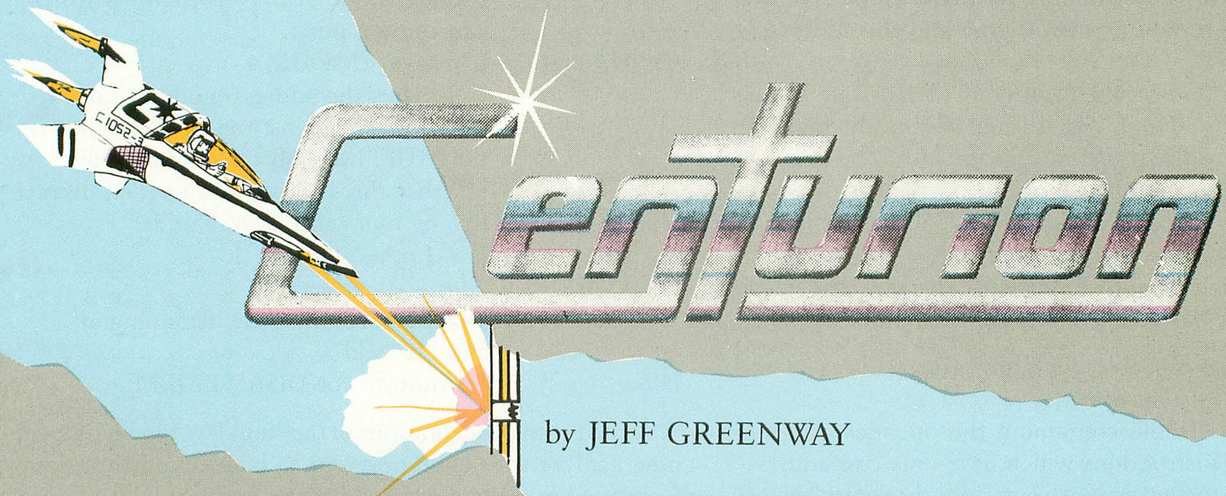
```
13FB   LDA   X)   0
13FD   STA   ,X   0
13FF   STY   ,X   1
1401   JMP   . .  F47   OK
```

Note that the address O,X points to the byte on the bottom of the data stack (it grows down!) and 1,X is the next byte up. F47 is the address of the Forth procedure NEXT, which passes execution to the next Forth word.

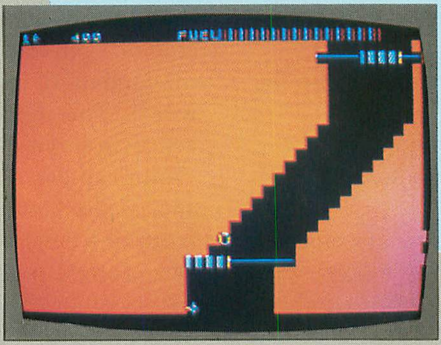
The first instruction loads the accumulator with the byte which was at the 16-bit address on the "top" (physically at the bottom) of the stack. The second instruction at 13FF stores the contents of the Y register (which you can count on being zero) into the high order byte on "top" of the stack. Thus the address on the "top" of the stack is replaced by the byte which was (and still is) stored at that address.

A word of warning: DISASSEMBLE will disassemble anything! It does not try to stop you from disassembling data, Forth code or even machine code starting at the wrong point. However, you can easily detect a listing of gibberish. The listing will tend to be long (over a screen), the addresses will be all over the place and rarely used instructions will pop up frequently.

continued on page 90



by JEFF GREENWAY



Imagine yourself as the commander of a small, intergalactic scout ship. You have just arrived at the entrance of a planetoid that harbors within it the mother ship of your enemy's forces. Your mission is to penetrate the defenses and destroy the mother ship.

The defenses consist of a twisting tunnel blocked in places by deadly force fields. Your blasters have no effect on the force fields, but you can blast through the "air locks" of the fields, if you can get a head-on shot at them.

Your forward progress is inexorable while you try to avoid the walls and force fields. Occasionally this will be impossible, so your one hope is to jump into hyperspace by pushing forward on the joystick. This five-second burst will carry you safely beyond a force field, but you must emerge in the tunnel beyond (not in a wall) or you will crash. Hyperspace travel exhausts your precious fuel at a prodigious rate, so only use it when you must.

With each of your three "lives" in a game, your fuel tank is refilled. Fuel pods in the tunnel replenish your supply if you can manage to shoot them. This is a crucial skill to master if you ever hope to get as far as the mother ship. The fuel tanks are placed at random in the tunnel and are worth 150 points, not to mention their fuel. Blasting through an airlock is good for 50 points.

The tunnel is very long, but if you finally do come upon the inner base, you will see four glowing reactors. Each must be blasted away to destroy the mother ship. A reactor is worth 500 points; the mother ship is worth 5,000. Meanwhile, you will be approaching the base — so be careful not to run into it! Move to the other edge, blast through one of the five airlocks, and escape into outer space.

Soon you will enter the tunnel again. Each time you navigate the tunnel the number of force fields increases and the mother ship moves faster. A score of 10,000 is very good.

Jeff Greenway, 14, from Ontario, Canada, not only programmed this challenging game, but drew the art and headline. When he contacted us last year, he was despondent that no one wanted to publish his work. We saw Centurion *as a natural for this International Issue. We hope it was worth the wait.* —ANTIC ED

System Requirements — 16K RAM & Joystick

```
5 REM ANTIC MAGAZINE MARCH 1984
6 REM CENTURION
7 REM BY JEFF GREENWAY
10 POKE 106,PEEK(106)-5:GRAPHICS 0:GOSUB 1710:SETCOLOR 2,0,0:POKE 755,224:SETCOLOR 0,8,12
20 DL=PEEK(560)+256*PEEK(561):POKE DL+10,7:POKE DL+11,6
30 POSITION 5,5:? "CENTURION":POSITION 11,7:? "BY JEFF GREENWAY":POSITION 10,9:? "FOR ANTIC MAGAZINE"
40 ST=(PEEK(106)+1)*256:FOR MOV=0 TO 1023:POKE ST+MOV,PEEK(57344+MOV):NEXT MOV
50 HH=10:SH=3:SC=0:TM=0
60 GRAPHICS 0:GOSUB 1710:SETCOLOR 2,0,0:POKE 755,224
70 POSITION 15,10:? "CENTURION":POSITION 12,12:? "BY JEFF GREENWAY"
80 POSITION 10,14:? "PRESS START TO PLAY ."
```

continued on page 80

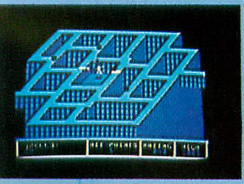
ZOMBIES©

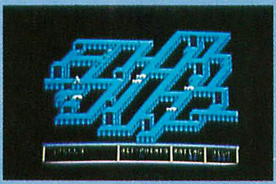
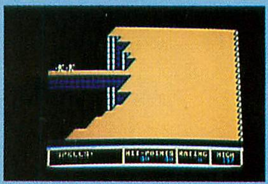


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Scrolling 3D graphics, on-line instructions, one or two player cooperative, seven different dungeons, 74 different screens, high score save to disk, full sound and color, zombies, poisonous snakes, giant spiders, evil orbs, scrolls, talismans, magic spells, lost crowns and spectacular underground scenery.




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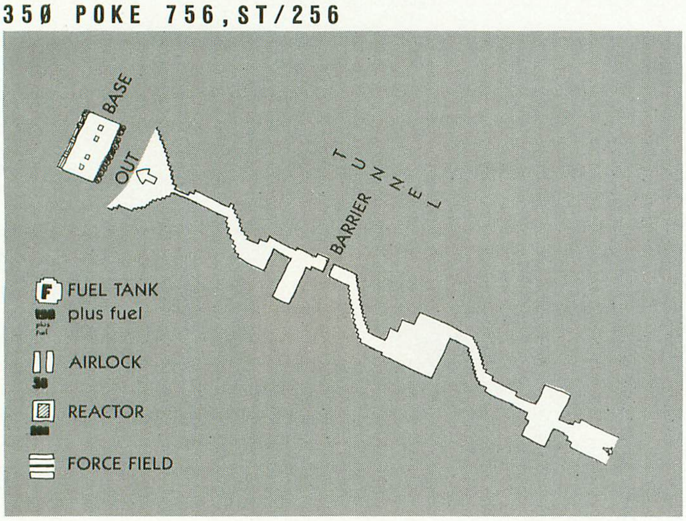
A fast action arcade fantasy for Atari's.*

By Mike Edwards from BRAM Inc.

Disk and Tape
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CENTURION continued from page 78

```
90 IF PEEK(53279)=6 THEN GOTO 110
100 GOTO 90
110 A=19:B=23:HT=0
120 IF SH<1 THEN GOTO 1680
130 GRAPHICS 0:GOSUB 1710:SETCOLOR 2,0
,0:POKE 755,224
140 RESTORE :POKE 82,0
150 FOR MOV=0 TO 7:READ AA:POKE 80+ST+
MOV,AA:NEXT MOV
160 DATA 24,24,60,102,219,126,60,24
170 FOR MOV=0 TO 7:READ AA:POKE 96+ST+
MOV,AA:NEXT MOV
180 DATA 145,145,145,145,145,145,145,1
45
190 FOR MOV=0 TO 7:READ AA:POKE 104+ST
+MOV,AA:NEXT MOV
200 DATA 60,126,195,207,195,207,207,12
6
210 FOR MOV=0 TO 7:READ AA:POKE 112+ST
+MOV,AA:NEXT MOV
220 DATA 170,0,0,170,0,0,170,0
230 FOR MOV=0 TO 7:READ AA:POKE 120+ST
+MOV,AA:NEXT MOV
240 DATA 85,85,85,85,85,85,85,85
250 FOR MOV=0 TO 7:READ AA:POKE 72+ST+
MOV,AA:NEXT MOV
260 DATA 231,231,231,231,231,231,231,2
31
270 FOR MOV=0 TO 7:READ AA:POKE 64+ST+
MOV,AA:NEXT MOV
280 DATA 60,126,255,255,255,255,126,60
290 FOR MOV=0 TO 7:READ AA:POKE 672+ST
+MOV,AA:NEXT MOV
300 DATA 0,0,60,126,126,60,0,0
310 FOR MOV=0 TO 7:READ AA:POKE 56+ST+
MOV,AA:NEXT MOV
320 DATA 67,34,21,89,157,232,111,67
330 FOR MOV=0 TO 7:READ AA:POKE 48+ST+
MOV,AA:NEXT MOV
340 DATA 170,170,255,255,255,255,170,1
70
350 POKE 756,ST/256
```




```
360 POSITION 15,10:? "READY!":FOR Z=1
TO 31
370 READ AA:READ BB:FOR ZZ=15 TO 0 STE
P -2
375 SOUND 0,AA,10,ZZ:SOUND 1,AA+1,10,Z
Z:SOUND 1,BB,10,ZZ:SOUND 1,BB,10,ZZ:NE
XT ZZ
380 DATA 108,0,108,0,53,0,53,0,108,0,1
08,0,53,0,53,0,121,0,121,0,114,0,114,0
,108,0,108,0,53,0,53,0,108,217,108,0
390 DATA 53,217,53,0,108,217,108,0,53,
217,53,0,121,243,121,243,114,144,96,19
3,108,217,108,217,53,108
400 NEXT Z:POSITION 15,10:? "       ":S
OUND 0,0,0,0:SOUND 1,0,0,0:SOUND 2,0,0
,0
410 POSITION 0,0:? SH;"E-"
420 IF SEC<>1 THEN GOTO 460
430 IF SEC=1 THEN COLOR 46:PLOT 0,1:DR
AWTO 38,1:COLOR 41
435 PLOT 5,1:PLOT 10,1:PLOT 15,1:PLOT
20,1:PLOT 25,1:PLOT 30,1:PLOT 35,1
440 FOR ZZ=2 TO 10:COLOR 47:PLOT 0,ZZ:
DRAWTO 38,ZZ:NEXT ZZ
450 COLOR 38:PLOT 5,4:PLOT 15,4:PLOT 2
5,4:PLOT 30,4:COLOR 45:PLOT 0,11:DRAWT
O 38,11
460 POSITION 15,0:? "FUEL":COLOR 44:PL
OT 19,0:DRAWTO 38,0:II=38
470 DATA 15,24,15,24,15,24,15,24,15,24
,15,24,15,24,15,24,15,24,15,24,15,24,1
5,24,15,24,15,24,15,24,16,23,17,22
480 DATA 17,22,17,22,17,22,17,22,17,22
,17,22,5,33,5,33,5,33,5,33,5,33,5,33,5
,33,5,33,5,33,5,33,5,33,5,33,5,33
490 DATA 10,23,15,23,15,23,15,23,15,23
,15,23,15,23,15,23,15,23,15,23,15,23,1
5,24,15,24,15,24,15,24,15,24,15,24
500 DATA 16,25,17,26,18,27,19,28,20,29
,21,30,22,31,23,32,24,33,25,34,26,35,2
7,36,28,37,28,37,28,37,28,37,28,37
510 DATA 28,37,28,37,28,37,28,37,28,37
,28,37,5,37,5,37,5,37,5,37,5,37,5,37,5
,37,5,37,5,37,5,37,5,37,5,37,5,37
520 DATA 5,37,5,37,5,37,5,37,5,37,5,37
,5,37,5,37,5,30,5,30,5,30,5,30,5,30,5,
30,5,30,5,25,5,25,5,25,5,25,5,25
530 DATA 5,25,5,20,5,20,5,20,5,20,5,15
,5,15,5,15,5,15,5,15,5,15,5,15,5,15,5,
15,5,15,5,15,5,15,6,16,7,17,8,18
540 DATA 9,19,10,20,11,21,12,22,13,23,
14,24,15,25,16,26,17,27,18,28,19,29,20
,30,21,31,22,32,23,33,24,34,25,35
550 DATA 26,36,27,37,28,38,28,38,28,38
,28,38,28,38,28,38,28,38,28,38,28,38,2
8,38,28,38,28,38,1,1,1,1,28,38,28,38
560 DATA 28,38,28,38,28,38,28,38,28,38
,28,38,28,38,28,38,27,37,5,37,5,37,5,3
7,5,37,5,37,15,37,15,37,15,37,15,37
570 DATA 15,37,15,37,15,37,15,37,15,37
,15,37,15,37,15,30,15,30,15,30,15,30,1
```

```
5,30,15,30,15,30,15,24,15,24,15,24
580 DATA 15,24,15,24,15,24,15,24,15,24
,15,24,15,24,15,24,15,24,15,24,15,24,1
5,24,15,24,15,24,15,24,15,24,15,24
590 DATA 3,24,3,24,3,24,3,24,3,24,3,24
,3,24,3,24,3,24,3,24,3,24,3,24,3,24,3,
24,3,24,3,24,3,24,3,24,3,24,3,24,3,24
600 DATA 3,24,3,24,3,24,3,15,3,15,3,15
,3,15,3,15,3,15,3,15,3,15,3,15,4,16
605 DATA 5,17,6,18,7,19,8,20,9,21,10,2
2,11,23,12,24
610 DATA 13,25,14,26,15,24,15,24,15,24
,15,24,15,24,15,24,15,24,15,24,15,24,1
5,24,15,24,15,24,15,24,15,24,15,24,15
620 DATA 24,15,24,15,24,15,24,15,24,15
,24,15,24,15,24,15,24,15,24,15,20,15,2
0,15,20,15,20,15,17,15,17,15,17,15,17
630 DATA 15,18,14,19,13,20,12,21,11,22
,10,23,9,24,8,25,7,26,6,27,5,28,4,29,3
,30,2,31,1,32,0,33,0,34,0,35,0,36
640 DATA 0,37,0,38,0,38
650 COLOR 42:PLOT A,B
660 IF YY=0 THEN POKE 112+ST,0:POKE 11
2+ST+6,0
670 IF YY=1 THEN POKE 112+ST,255:POKE
112+ST+6,255
680 YY=YY+1:IF YY>1 THEN YY=0
690 COLOR 32:PLOT II,0:II=II-0.15
700 IF II<19 THEN GOTO 1310
710 IF SEC=1 THEN IF TY=0 THEN POKE 48
+ST,85:POKE 48+ST+1,85:POKE 48+ST+6,85
:POKE 48+ST+7,85
720 IF SEC=1 THEN IF TY=1 THEN POKE 48
+ST,170:POKE 48+ST+1,170:POKE 48+ST+6,
170:POKE 48+ST+7,170
730 IF SEC=1 THEN TY=TY+1:IF TY>1 THEN
 TY=0
740 IF SEC=1 THEN TM=TM+1:IF TM>500 TH
EN TM=0:SEC=0:GOTO 110
750 IF SEC=1 THEN GOTO 820
760 POSITION 19,1:? "■":LOCATE A,B,C:C
OLOR 42:PLOT A,B
770 READ AA:READ BB:COLOR 47:PLOT 0,1:
DRAWTO AA,1:PLOT BB,1:DRAWTO 38,1
780 IF UU=0 THEN GG=INT(RND(1)*HH):IF
GG=0 THEN UU=1:GOSUB 1020
790 IF UU=1 THEN VV=VV+1:IF VV>10 THEN
 VV=0:UU=0
800 WW=INT(RND(1)*15):IF WW=1 THEN GOS
UB 990
810 IF SEC=0 THEN GOTO 830
820 TG=TG+1:IF TG>HH THEN POSITION 0,1
:? "■":TG=0
830 TRAP 1600
840 SOUND 1,38,0,5
850 IF YY=1 THEN SOUND 0,93,10,8
860 POSITION 5,0:? SC
870 POKE 77,0
880 IF STRIG(0)=0 THEN GOSUB 1050
890 X=STICK(0):COLOR 32:PLOT A,B
900 IF X=7 OR X=5 THEN A=A+1
910 IF X=11 OR X=9 THEN A=A-1
920 IF SEC=0 THEN IF X=14 OR X=10 OR X
=6 THEN GOSUB 1230
930 IF A<2 THEN A=2
940 IF A>38 THEN A=38
950 LOCATE A,B,D:IF C<>42 AND C<>32 AN
D C<>160 THEN GOTO 1350
960 IF D<>42 AND D<>32 AND D<>160 THEN
 GOTO 1350
970 SOUND 0,0,0,0
980 GOTO 650
990 XX=INT(RND(1)*BB):IF XX<AA+1 THEN
XX=AA+1
1000 COLOR 45:PLOT XX,1
1010 RETURN
1020 COLOR 46:PLOT AA,1:DRAWTO BB,1
1030 EE=INT(RND(1)*BB-1):IF EE<AA+2 TH
EN EE=AA+2
1040 COLOR 41:PLOT EE-2,1:DRAWTO EE+2,
1:RETURN
1050 LOCATE A,B-1,CC:IF CC<>32 AND CC<
>160 THEN GOTO 1350
1060 COLOR 20:PLOT A,B-1:SOUND 0,20,0,
15:FOR X=1 TO 3:NEXT X
1070 COLOR 40:PLOT A,B-1:SOUND 0,25,0,
15:FOR X=1 TO 3:NEXT X
1080 COLOR 20:PLOT A,B-1:SOUND 0,20,0,
10:FOR X=1 TO 3:NEXT X:COLOR 32:PLOT A
,B-1
1090 FOR TB=B-2 TO 1 STEP -1:LOCATE A,
TB,TC
1100 IF TC<>32 AND TC<>160 AND TC<>46
AND TC<>174 THEN GOTO 1130
1110 IF TC=46 OR TC=174 THEN GOTO 1210
1120 NEXT TB:SOUND 0,0,0,0:SOUND 1,0,0
,0:RETURN
1130 COLOR 20:PLOT A,TB:SOUND 0,35,0,1
5:FOR X=1 TO 3:NEXT X
1140 COLOR 40:PLOT A,TB:SOUND 0,40,0,1
5:FOR X=1 TO 3:NEXT X
1150 COLOR 20:PLOT A,TB:SOUND 0,35,0,1
0:FOR X=1 TO 3:NEXT X:COLOR 32:PLOT A,
TB
1160 IF TC=41 THEN SC=SC+50
1170 IF TC=43 THEN SC=SC+100
1180 IF TC=45 THEN SC=SC+150:GOTO 1440
1190 IF TC=38 THEN SC=SC+500:HT=HT+1:I
F HT>3 THEN GOTO 1470
1200 SOUND 0,0,0,0:SOUND 1,0,0,0:RETUR
N
1210 FOR ZZ=15 TO 0 STEP -2:SOUND 0,12
1,10,ZZ:SOUND 1,123,10,ZZ:NEXT ZZ:SOUN
D 0,0,0,0:SOUND 1,0,0,0
1220 RETURN
1230 SOUND 1,0,0,0:SOUND 2,0,0,0:FOR Z
Z=255 TO 0 STEP -10:SOUND 0,ZZ,0,15
1235 SETCOLOR 2,0,PEEK(53770):NEXT ZZ:
SETCOLOR 1,0,0:SETCOLOR 2,0,14
1240 TRAP 1580:FOR ZZ=1 TO 10
```

continued on next page

```
1250 POSITION 19,1:? "⊞":COLOR 42:PLOT A,B:READ AA:READ BB:COLOR 47:PLOT 0,1:DRAWTO AA,1:PLOT BB,1:DRAWTO 38,1
1260 IF UU=0 THEN GG=INT(RND(1)*HH):IF GG=0 THEN UU=1:GOSUB 1020
1270 COLOR 32:PLOT II,0:II=II-0.5:WW=INT(RND(1)*25):IF WW=1 THEN GOSUB 990
1280 IF II<19 THEN GOTO 1310
1290 NEXT ZZ:FOR ZZ=0 TO 255 STEP 10:SOUND 0,ZZ,0,15
1295 SETCOLOR 2,0,PEEK(53770):NEXT ZZ:SETCOLOR 2,0,0:SETCOLOR 1,0,10
1300 SOUND 0,0,0,0:RETURN
1310 SEC=0:SOUND 1,0,0,0:SOUND 2,0,0,0:FOR ZZ=1 TO 5
1320 POSITION 15,10:? "OUT OF FUEL!":SOUND 0,40,10,15:FOR X=1 TO 60:NEXT X
1330 POSITION 15,10:? "            ":SOUND 0,0,0,0:FOR X=1 TO 60:NEXT X
1340 NEXT ZZ:GOTO 1350
1350 SETCOLOR 1,0,10:SOUND 1,0,0,0:SOUND 2,0,0,0:FOR ZZ=15 TO 5 STEP -0.25
1355 SOUND 0,20,0,ZZ:SETCOLOR 2,0,PEEK(53770):NEXT ZZ
1360 SEC=0:SETCOLOR 2,0,0:COLOR 39:PLOT A,B:SOUND 0,20,0,15:FOR X=1 TO 10:NEXT X
1370 COLOR 39:PLOT A-1,B-1:PLOT A+1,B-1:PLOT A-1,B:PLOT A+1,B:SOUND 0,25,0,15:FOR X=1 TO 10:NEXT X
1380 COLOR 39:PLOT A-2,B-2:PLOT A+2,B-2:PLOT A-2,B:PLOT A+2,B:SOUND 0,20,0,15:FOR X=1 TO 10:NEXT X
1390 COLOR 39:PLOT A-3,B-3:PLOT A+3,B-3:PLOT A-3,B:PLOT A+3,B:SOUND 0,20,0,15:FOR X=1 TO 10:NEXT X
1400 COLOR 39:PLOT A-4,B-4:PLOT A+4,B-4:PLOT A-4,B:PLOT A+4,B:SOUND 0,20,0,15:FOR X=1 TO 10:NEXT X
1410 SOUND 0,0,0,0:SOUND 1,0,0,0:FOR X=1 TO 200:NEXT X
1420 FOR ZZ=1 TO 25:POSITION 0,1:? "⊞":NEXT ZZ
1430 SH=SH-1:GOTO 110
1440 SOUND 1,0,0,0:FOR ZZ=II TO II+5:IF ZZ>38 THEN GOTO 1460
1450 COLOR 44:PLOT ZZ,0:SOUND 0,ZZ,10,10:FOR X=1 TO 2:NEXT X:SOUND 0,0,0,0:NEXT ZZ
1460 II=ZZ-1:SOUND 0,0,0,0:SOUND 1,0,0,0:RETURN
1470 SOUND 2,0,0,0:FOR ZZ=1 TO 20
1480 SETCOLOR 2,0,PEEK(53770):FOR XX=0 TO 255 STEP 20:SOUND 0,XX,10,15:SOUND 1,XX+2,10,15:NEXT XX
1490 NEXT ZZ
1500 FOR QQ=1 TO 5
1510 FOR ZZ=15 TO 0 STEP -0.5:SOUND 0,20,0,ZZ:SETCOLOR 2,0,ZZ:SETCOLOR 1,0,ZZ:NEXT ZZ
1520 NEXT QQ
1530 ? "⊠":SETCOLOR 1,0,10:COLOR 42:PLOT A,B:SOUND 0,0,0,0:SOUND 1,0,0,0
1540 POSITION 2,5:? "BASE DESTROYED!!! BONUS 5000 POINTS"
1550 SC=SC+5000:FOR X=1 TO 500:NEXT X
1560 HH=HH-2:IF HH<2 THEN HH=2
1570 SEC=0:GOTO 110
1580 FOR ZZ=0 TO 255 STEP 5:SOUND 0,ZZ,0,15:SETCOLOR 2,0,PEEK(53770):NEXT ZZ:SETCOLOR 2,0,0:SETCOLOR 1,0,10
1590 SOUND 0,0,0,0:GOTO 1600
1600 SOUND 1,0,0,0:SOUND 2,0,0,0
1610 COLOR 42:PLOT A,B:SOUND 0,0,0,0:POSITION 14,10:? "YOU ESCAPED!!"
1620 FOR X=1 TO 200:NEXT X
1630 POSITION 5,10:? "PREPARE TO BATTLE THE BASE!!!":FOR X=1 TO 200:NEXT X
1640 POSITION 5,10:? "DESTROY EACH GLOWING REACTOR TO"
1650 FOR X=1 TO 200:NEXT X
1660 POSITION 2,10:? "DESTROY THE MOTHER SHIP. GOOD LUCK!":FOR X=1 TO 500:NEXT X
1670 SEC=1:GOTO 110
1680 POSITION 15,10:? "GAME OVER":SETCOLOR 2,0,0:SETCOLOR 1,0,10
1685 SOUND 0,0,0,0:SOUND 1,0,0,0:SOUND 2,0,0,0:SOUND 3,0,0,0
1690 IF PEEK(53279)=6 THEN GOTO 50
1700 GOTO 1690
1710 POKE 16,64:POKE 53774,3:RETURN
```

TYPO TABLE

Variable checksum = 518548

Line num range			Code	Length
5	–	50	SY	512
60	–	170	UM	516
180	–	290	MS	483
300	–	380	IP	517
390	–	440	KS	551
450	–	490	UB	539
500	–	540	TA	529
550	–	590	HY	541
600	–	660	OC	546
670	–	740	KZ	558
750	–	850	UV	525
860	–	970	WA	438
980	–	1080	FY	577
1090	–	1170	ID	515
1180	–	1235	TK	560
1240	–	1300	OM	526
1310	–	1355	GR	502
1360	–	1390	JE	544
1400	–	1450	LA	506
1460	–	1530	WW	533
1540	–	1610	JC	519
1620	–	1685	AV	526
1690	–	1710	XE	89

NIGHTMARE COME TRUE

A cautionary tale

by DAVID and SANDY SMALL

Our "Nightmare Mission" series has now stretched over four issues of ANTIC (October 1983, November 1983, December 1983 and February 1984). In this series, we've covered some of the techniques and tools we used to develop a game cartridge in much less time than is usually required.

But, so far, this process has seemed too easy, too effortless. We've passed along some tips and shared some of our experiences and problems with you, but we've failed to mention the disaster that befell us on the day before our finished project was due to be delivered. You'll recall that if our game was not ready by a certain date, we would not be paid for our frantic efforts. This is the story of the final stage of our nightmare mission.

David and Sandy Small are professional programmers who work extensively with Atari computers and Atari-compatible peripherals and software to produce commercial software for the Atari. In Systems Guide, they share discoveries, insights, experiences and secrets of professional programming that should be of interest to others who are at or near their level of practice.

THE DAY BEFORE

It was early Sunday night. Our contract called for the game to be delivered to Washington, D.C., on Monday. The program was completed, and we were getting ready to burn it into EPROMs. This involves taking the program from disk and copying it into EPROM memory chips (Eraseable-Programmable-Read-Only-Memories). These are then plugged into an Atari cartridge to form a cartridge-based game program.

You'll recall (from last month's column) that we wanted to use two 27128 16K EPROMs to create a 32K cartridge. We had plugged in an MPC EPROM burner via joystick ports 3 and 4, and had connected it to the two 27128's. We also had a fast, homebrew disk drive of our own design hooked in via the Operating System slot, a Bit-3 80-column board in the back slot, and a RAM-PAGE 32K board in slot 3. This gave us a total of 48K in the machine.

A BLINDING FLASH

When it was time to burn the first EPROM, we powered up the Atari and our disk drives, loaded the EPROMMER program for the MPC, and reached down to plug in the MPC's power cord. Just then, there was this blinding flash! Sparks flew across the room! Was the world coming to an end?

THE AFTERMATH

After a few seconds, we opened our eyes. Computer reflexes took over: We yanked the plug out of the wall. The smell of burnt bakelite was in the air, and we knew that some circuits had burned out.

We looked at the EPROM burner. Smoke was drifting up from it. Its two capacitors had been blown apart (this is common when an electrolytic capacitor is suddenly overwhelmed). We followed the MPC's cord to the Atari's front ports:

continued on next page

The front-port traces on the plugs had been fried right off the circuit board. All that was left was burn marks.

With a shudder, we realized that those traces led directly to the Atari's PIA chip, a sensitive component that needs to be treated carefully at all costs, and from there directly into the system data and address busses — which lead in all directions. Things didn't look good.

Saying a prayer for the soul of our new machine, we turned the power back on. This was an automatic reflex; the TV screen showed static, which indicated that the Atari was turned off. But the power was already on!

We had seen this happen once before, when a memory board had shorted out. Hoping that only the memory boards were affected, we stripped them out and replaced them. Still nothing. So we opened up the Atari to find . . . carnage. There were chips with the middles blown out of them, diodes with smoking innards, and pieces of LS logic scattered throughout the inside of the machine.

BAPTISM BY FIRE

The bad news was not yet over. We turned to the Bit-3 ($350) and RAMPAGE ($200) boards, and tried them in a different Atari. When we plugged them in, the machine quit working. Both boards were ruined.

To top things off, our disk drive system no longer worked (we sell these for $1500).

We added up the damages, and found that the mysterious flash of light had cost us at least $3000. And, at that moment, we very nearly gave up on our game project. It was midnight. The project was due the next day. And our equipment had just been destroyed.

But we didn't quit.

Someday, something like this will happen to you. You, too, will face the wall, as we did, in a cloud of smoke, with a contract about to be lost, and discouragement in the air all around you. But you just can't quit. Being part of this field means that one day you will receive a baptism by fire. When it happens, you have to grit your teeth and do whatever has to be done. If everyone could do it, where would that leave us?

THE ROAD BACK

We still had one working Atari and an 810. We called Dave Mann, our local users' group president, hoping that he would still be awake. He was, and he offered to loan us his EPROM burner. By the time we got it, though, it was after 1 a.m. At that point, we started, once again, to burn the EPROMs (fortunately, we had a spare — our first one had been cooked in the MPC).

DETECTIVE WORK

While the EPROMs burned, which took several hours, we looked over our damaged equipment to try to determine the cause of the accident. We soon found it: a ground loop.

Several 110-volt lines enter the MPC EPROM burner and end on the circuit board. The unit's case fits tightly over the board, so tightly, in fact, that in this case one of the 110-volt wires actually touched the case. This electrified the case, and the ground, of the MPC machine. Ordinarily, you wouldn't notice that this had happened, because the Atari "floats" (i.e., isn't electrically grounded to its power supply). Unfortunately, our Atari was grounded, via the 3-wire disk drive units that our disk system ran. When we'd plugged in the MPC, 110 volts of A.C. had shot through the + 5-volt D.C. power supply for the MPC, Atari and disk drive unit.

Voltage measures units of pressure, and 110 volts exert much greater pressure than five volts. The insides of the integrated-circuit chip are designed to withstand five to ten volts of pressure. But not 110 volts. We were unable to find a single chip in any of our damaged units that had not burned out; all of them had blown apart internally under the force of the 110-volt current. And some of them had heated up so violently that they'd actually exploded, and blown the lid off the circuit base.

COULD IT HAPPEN TO YOU?

Could this happen to you? Do you ever hook up anything to your Atari that does not use one of the standard Atari power supplies (which come with the special connector)? Anything that plugs into an outlet is suspect. Examples include: Percom disk drives, the ATR-8000, the California Microlink 8" disk drive setup, and of course the MPC EPROM burner. If any one of these is defective, and provides a ground outlet for the 110-volt current, your Atari could be in danger.

SAFETY CHECKS

To protect yourself and your equipment, you should check the grounds on these machines using a 110-volt A.C. voltmeter. They should register 0 as compared to the wall ground. Plug in one device at a time and check it for 110-volt leakage. Also, remember that the bypass circuits used to prevent this sort of problem are often blown out by a nearby power surge or lightning strike. After such an occurrence, it would be a very good idea to check your equipment for ground safety before turning it on.

In our case, our Atari was destroyed. If we had been caught between a 110-volt current and the ground, we could have been killed. It is certainly worth the investment to get yourself a voltmeter and be safe.

ASK FOR HELP, IF NECESSARY

If you don't know much about electricity, and don't know how to check the grounds, your local users' group or dealer can probably help you make sure your equipment is safe. We've also seen pamphlets on the subject at several local electronics stores. And a voltmeter need not cost more than $10 or so.

THE END OF A SAGA

Finally, at about 5 a.m., we finished burning the EPROMs. We plugged them into the cartridges for the first time, and found that, of course, none of them worked. We shortly discovered the writing mistakes that had caused the problem, and soon we had all four cartridges running. By then it was 6:30. We rushed to the airport, caught a 7:30 flight to Washington, D.C., and hand-delivered the cartridges to the software represen-

tative who met us there. This, at last, was the end of our nightmare mission. And at the end of twenty-eight hours without sleep, it came none too soon.

INSURING AGAINST NIGHTMARES

After the trauma was over, we remembered that, some time back, we had purchased a special computer insurance package. Computers are not covered by the typical homeowners' policy, so we had looked for and found a policy designed to cover our machine (it's protected by Columbia National General Agency, 88 E. Broad St., Columbus, Ohio 43215).

Most likely, your home computer (and all of your software) is not currently insured. If anything — from theft to fire to a ground loop — happens to it, you're out of luck.

Our insurance policy covers hardware and software that is lost — for any reason. So the day after we turned in our project, we called our insurance company and arranged to have them send a local adjustor to survey the damages. They promptly took care of this, and just as promptly settled our claim.

Professional software developers cannot afford *not* to have their computer equipment and software insured. We were very lucky to have had insurance; we could just as easily have had to completely write off the value of our damaged equipment and start from scratch. Insurance is not expensive, it can be comprehensive, and it can save you in a pinch. We highly recommend that you look into it.

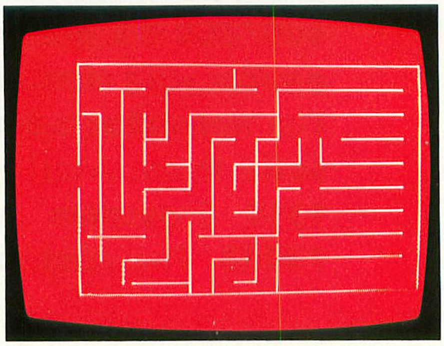
We wrote this article for two reasons: To show that our "nightmare mission" actually had some nightmarish aspects, and to warn you not to let the same kind of thing happen to you. The computer experience is not always an easy one; in our years of dealing with computers and computerists, we've heard many tales of woe. Remember our warnings. But remember, also, that our story had a happy ending after all: Our insurance paid for the damages and our game program was finished on time. And best of all, we survived the ordeal.

★★BONUS GAME★★

ESCAPEMAZE

by C. G. ROBERTS

This maze game won the Waikato, New Zealand, Atari Users' Club prize for programming. The program requires 16K RAM for cassette, and 24K RAM with DOS. It runs on all Atari computers.



The object of the game is to move your "man" (the flashing dot first located at the right side of the screen) successfully through three mazes. Each maze must be conquered in its turn by travelling through the preceding maze.

There is only one exit route for each maze, even though there may appear to be more. The first maze has invisible walls that, if hit, send your man back to the beginning. The time limit for each maze leaves little margin for hesitation.

If you succeed in escaping the first maze, you will see the path you took and hear a round of cosmic applause. Then you will see the maze transform into the second maze.

This maze is harder. Random walls are built while your man pursues the exit. If you hit a wall here, you are transported to a random spot in the same maze. You must orient yourself quickly to your new position and proceed with the escape, if you can.

However, being transported by touching the walls can be an advantage if a random wall happens to block your only escape path. If you are lucky, your man can even be transported to the teleportal section of the maze, near the exit, that sends you immediately into the third maze.

Maze three! Well, you don't want to hit the walls there or you'll wish you hadn't. Your player will be sent back to the start. Time is always your enemy in this game, and the third maze itself is the hardest.

For the determined escapee, there is more cosmic applause at the end of three mazes, but the best reward will be sunlight, fresh air and a walk around the block. If you are really a masochist, press the fire button to play again.

TAKE-APART

Lines 5–80: Introduction.

Lines 90–280: Commands for the first maze.

GOSUB 270 reads DATA lines 110–170 to draw a maze. GOSUB 860 (to 950) gives joystick commands which control the moving pixel. These commands are the same for all three mazes. Line 210 tests the X,Y coordinates for the invisible walls, which, if positive, send the pixel back to start. Line 220 tests to see if the pixel is at the door of the first maze. Line 230 (with GOSUB 680) tests for the pixel hitting the the wall (if positive, GOTO 250). GOSUB 1080 records the number of wall hits. Line 240 draws the pixel with color 1 and erases the trail with color 3.

Lines 290–360: Graphics and sound reward for escaping first maze.

Lines 370–510: Commands for second maze.

Line 480 tests to send the pixel to the third maze. Line 500, with GOSUB 1040, tests for the pixel hitting the wall. If positive GOSUB 990 (to 1010) gives the graphics and sound routine. If negative, lines 1050–1060 randomly draw a wall in the maze at a low probability rate. GOSUB 1070 randomly places the pixel elsewhere in the maze if the wall is touched.

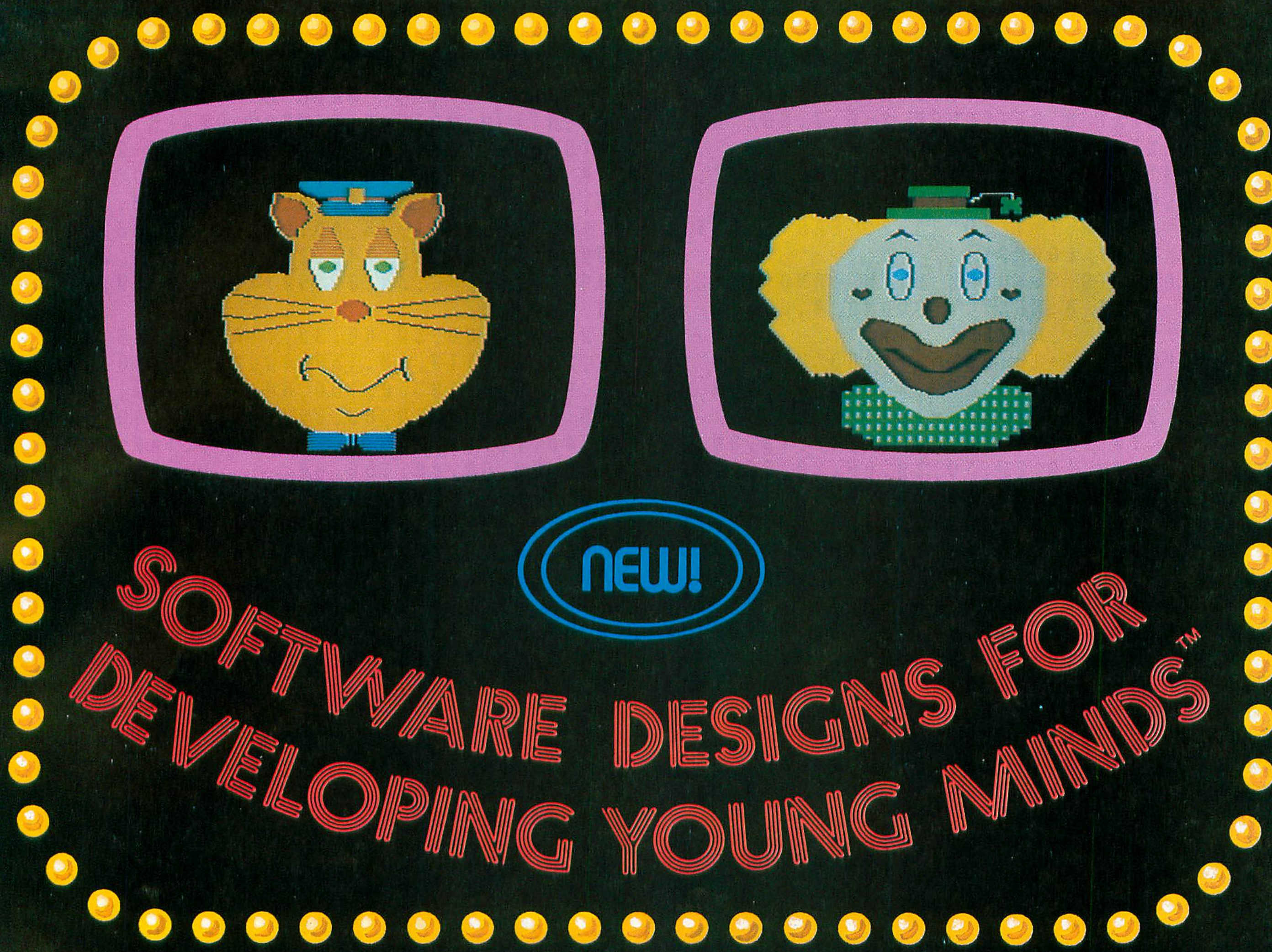
Lines 520–710: Commands for third maze.

Line 640 tests if the pixel is at the exit of the third maze. If positive, lines 720–850 give graphics and sound commands for conclusion and replay option. Line 660, with GOSUB 700, tests for the pixel hitting the wall. If positive, it sends the pixel back to the start of the first maze.

```
5 REM ANTIC MAGAZINE MARCH 1984
6 REM ESCAPE MAZE
7 REM BY G.C. ROBERTS
20 GRAPHICS 0:POKE 752,1:SETCOLOR 2,6,
1:POSITION 0,10:? ,"     ESCAPE MAZE":P
OSITION 0,12:? ,"    G.C. ROBERTS"
30 POSITION 0,14:? ,"          1982"
40 FOR I=1 TO 255 STEP 4:SOUND 0,I,8,1
0:GOSUB 970:NEXT I
```

continued on page 88

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ESCAPE MAZE continued from page 86

```
5Ø FOR T=1 TO 1Ø:SETCOLOR 2,6,1:FOR D=1 TO 5Ø:NEXT D:SETCOLOR 2,6,7:FOR D=1 TO 5Ø:NEXT D:NEXT T:SOUND Ø,Ø,Ø,Ø
6Ø GRAPHICS Ø:POKE 752,1:SETCOLOR 2,4,6:SETCOLOR 1,Ø,Ø:RESTORE
7Ø TIME=Ø:FOR T=1 TO 23:? "EASY! NOT AS EASY AS IT LOOKS!"
8Ø FOR R=1 TO 5:SOUND Ø,INT(RND(1)*256),1Ø,1Ø:NEXT R:NEXT T:SOUND Ø,Ø,Ø,Ø
9Ø REM *    <<< MAZE 1 >>>
1ØØ GRAPHICS 7+16:COLOR 2:GOSUB 27Ø
11Ø DATA Ø,Ø,159,Ø,159,Ø,159,95,159,95,Ø,95,Ø,95,Ø,5Ø,Ø,4Ø,Ø,Ø
12Ø DATA 1Ø,1Ø,3Ø,1Ø,4Ø,1Ø,8Ø,1Ø,9Ø,1Ø,15Ø,1Ø,2,2Ø,1Ø,2Ø,5Ø,2Ø,9Ø,2Ø,1ØØ,2Ø,15Ø,2Ø,3Ø,3Ø,4Ø,3Ø,6Ø,3Ø,7Ø,3Ø
13Ø DATA 8Ø,3Ø,9Ø,3Ø,12Ø,3Ø,15Ø,3Ø,4Ø,4Ø,5Ø,4Ø,7Ø,4Ø,1ØØ,4Ø,11Ø,4Ø,15Ø,4Ø,3Ø,5Ø,5Ø,5Ø,9Ø,5Ø,1ØØ,5Ø,11Ø,5Ø,15Ø,5Ø
14Ø DATA 4Ø,6Ø,6Ø,6Ø,7Ø,6Ø,8Ø,6Ø,1ØØ,6Ø,15Ø,6Ø,4,7Ø,3Ø,7Ø,54,7Ø,9Ø,7Ø,1ØØ,7Ø,15Ø,7Ø,2Ø,8Ø,4Ø,8Ø,6Ø,8Ø,76,8Ø
15Ø DATA 9Ø,8Ø,15Ø,8Ø,24,9Ø,5Ø,9Ø,7Ø,9Ø,8Ø,9Ø,1Ø,2Ø,1Ø,8Ø,2Ø,1Ø,2Ø,6Ø,2Ø,8Ø,2Ø,9Ø,3Ø,2Ø,3Ø,4Ø,3Ø,5Ø,3Ø,6Ø
16Ø DATA 4Ø,1Ø,4Ø,3Ø,4Ø,6Ø,4Ø,8Ø,5Ø,2Ø,5Ø,5Ø,5Ø,64,5Ø,94,6Ø,3Ø,6Ø,7Ø,6Ø,8Ø,6Ø,95,7Ø,2,7Ø,1Ø,7Ø,4Ø,7Ø,5Ø
17Ø DATA 8Ø,3Ø,8Ø,6Ø,8Ø,7Ø,8Ø,9Ø,9Ø,1Ø,9Ø,3Ø,9Ø,5Ø,9Ø,7Ø,9Ø,74,9Ø,95,1ØØ,3Ø,1ØØ,4Ø,11Ø,3Ø,11Ø,4Ø,999,999
18Ø X=156:Y=48
19Ø COLOR 1:SETCOLOR 2,Ø,Ø
2ØØ GOSUB 86Ø
21Ø IF MAZE=1 THEN IF X<6Ø AND Y<4Ø THEN GOTO 18Ø
22Ø IF X<1 AND Y<5Ø THEN GOTO 29Ø
23Ø GOSUB 68Ø
24Ø COLOR 1:SOUND Ø,Ø,Ø,Ø:PLOT X,Y:COLOR 3:PLOT J,K:GOTO 19Ø
25Ø GOSUB 1Ø8Ø
26Ø SOUND Ø,64,1Ø,8:GOTO 18Ø
27Ø READ X,Y:IF X<>999 THEN PLOT X,Y:READ X,Y:DRAWTO X,Y:GOTO 27Ø
28Ø RETURN
29Ø X=1:Y=45:FOR T=1 TO 3:FOR C=1 TO 14:SOUND Ø,64,C,C:SETCOLOR 1,C,C:FOR D=1 TO 35:NEXT D:NEXT C
3ØØ FOR W=1 TO 2Ø:NEXT W:NEXT T
31Ø FOR C=Ø TO 15 STEP 3:FOR D=1 TO 1Ø:NEXT D:SETCOLOR 4,C,7
32Ø FOR P=243 TO 31 STEP -7:FOR D=1 TO 5:NEXT D:SOUND Ø,P,1Ø,9:NEXT P:NEXT C
33Ø GRAPHICS Ø:POKE 752,1:SETCOLOR 2,6,4
34Ø POSITION 0,1Ø:PRINT ,,"CONGRATULATIONS!"
35Ø PRINT ,"YOU FOUND A WAY AROUND THE INVISIBLE WALLS!"
36Ø SOUND Ø,Ø,Ø,Ø:FOR T=1 TO 9ØØ:NEXT T
37Ø REM *    <<< MAZE 2 >>>
38Ø HIT=Ø:MAZE=Ø:TIME=Ø:GRAPHICS 7+16:SETCOLOR 1,8,1Ø:COLOR 2:GOSUB 27Ø
39Ø DATA Ø,Ø,159,Ø,159,Ø,159,95,159,95,Ø,95,Ø,95,Ø,5Ø,Ø,4Ø,Ø,Ø,2Ø,1Ø,5Ø,1Ø,6Ø,1Ø,15Ø,1Ø,1,2Ø,3Ø,2Ø,4Ø,2Ø,66,2Ø
4ØØ DATA 8Ø,2Ø,14Ø,2Ø,2Ø,1Ø,2Ø,2Ø,3Ø,Ø,3Ø,1Ø,1Ø,3Ø,3Ø,3Ø,9Ø,3Ø,1ØØ,3Ø,44,8Ø,5Ø,8Ø
41Ø DATA 3Ø,3Ø,6Ø,3Ø,11Ø,3Ø,14Ø,3Ø,1Ø,4Ø,5Ø,4Ø,11Ø,4Ø,15Ø,4Ø,2Ø,5Ø,56,5Ø,8Ø,5Ø,9Ø,5Ø,11Ø,5Ø,15Ø,5Ø,Ø,6Ø,2Ø,6Ø
42Ø DATA 24,6Ø,6Ø,6Ø,1ØØ,6Ø,14Ø,6Ø,2Ø,7Ø,4Ø,7Ø,5Ø,7Ø,76,7Ø,8Ø,7Ø,14Ø,7Ø,1Ø,8Ø,4Ø,8Ø,6Ø,8Ø,15Ø,8Ø
43Ø DATA 1Ø,4Ø,1Ø,56,2Ø,5Ø,2Ø,95,3Ø,2Ø,3Ø,3Ø,5Ø,3Ø,5Ø,4Ø,5Ø,64,5Ø,95,6Ø,1Ø,6Ø,6Ø,7Ø,2Ø,7Ø,7Ø,8Ø,2Ø,8Ø,5Ø
44Ø DATA 8Ø,6Ø,8Ø,7Ø,9Ø,34,9Ø,66,1ØØ,3Ø,1ØØ,6Ø,11Ø,3Ø,11Ø,4Ø,14Ø,2Ø,14Ø,3Ø,14Ø,6Ø,14Ø,7Ø,15Ø,1Ø,15Ø,4Ø
45Ø DATA 4Ø,14,4Ø,2Ø,6Ø,84,6Ø,95,7Ø,Ø,7Ø,1Ø,11Ø,5Ø,11Ø,56,15Ø,5Ø,15Ø,8Ø,999,999
46Ø X=156:Y=48
47Ø COLOR 1:SETCOLOR 2,Ø,Ø
48Ø IF X<5Ø AND Y<5Ø THEN GOTO 53Ø
49Ø GOSUB 86Ø
5ØØ GOSUB 1Ø4Ø
51Ø COLOR 1:SOUND Ø,Ø,Ø,Ø:PLOT X,Y:COLOR 3:PLOT J,K:GOTO 47Ø
52Ø REM *    <<< MAZE 3 >>>
53Ø TIME=Ø:GRAPHICS 7+16:SETCOLOR 1,4,1Ø:COLOR 2:GOSUB 27Ø
54Ø DATA Ø,Ø,159,Ø,159,Ø,159,95,159,95,Ø,95,Ø,95,Ø,6Ø,Ø,5Ø,Ø,Ø
55Ø DATA 1Ø,1Ø,5Ø,1Ø,6Ø,1Ø,9Ø,1Ø,1ØØ,1Ø,14Ø,1Ø,1Ø,2Ø,6Ø,2Ø,8Ø,2Ø,13Ø,2Ø,14Ø,2Ø,15Ø,2Ø,2Ø,3Ø,86,3Ø,9Ø,3Ø,11Ø,3Ø
56Ø DATA 13Ø,3Ø,14Ø,3Ø,1,4Ø,2Ø,4Ø,5Ø,4Ø,14Ø,4Ø,2Ø,5Ø,3Ø,5Ø,54,5Ø,13Ø,5Ø,1Ø,6Ø,2Ø,6Ø,5Ø,6Ø,96,6Ø,1ØØ,6Ø,11Ø,6Ø
57Ø DATA 54,7Ø,9Ø,7Ø,12Ø,7Ø,136,7Ø,2Ø,8Ø,3Ø,8Ø,4Ø,8Ø,6Ø,8Ø,7Ø,8Ø,14Ø,8Ø,1Ø,9Ø,2Ø,9Ø,34,9Ø,66,9Ø,7Ø,9Ø,15Ø,9Ø
58Ø DATA 1Ø,1Ø,1Ø,3Ø,1Ø,5Ø,1Ø,86,2Ø,4Ø,2Ø,6Ø,2Ø,64,2Ø,9Ø,3Ø,34,3Ø,76,3Ø,8Ø,3Ø,95,4Ø,3Ø,4Ø,8Ø,5Ø,2Ø,5Ø,3Ø
59Ø DATA 5Ø,4Ø,5Ø,76,5Ø,8Ø,5Ø,9Ø,6Ø,1,6Ø,1Ø,7Ø,14,7Ø,3Ø,7Ø,64,7Ø,95,8Ø,1Ø,8Ø,2Ø,9Ø,3Ø,9Ø,4Ø,1Ø,3Ø,1Ø,4Ø
6ØØ DATA 1ØØ,14,1ØØ,3Ø,1ØØ,44,1ØØ,7Ø,11Ø,6Ø,11Ø,8Ø,12Ø,2Ø,12Ø,36,12Ø,6Ø,12Ø,7Ø,14Ø,1Ø,14Ø,3Ø,14Ø,4Ø,14Ø,7Ø
61Ø DATA 13Ø,5Ø,13Ø,6Ø,15Ø,2Ø,15Ø,5Ø,15Ø,6Ø,15Ø,9Ø,999,999
62Ø X=156:Y=55
63Ø COLOR 1:SETCOLOR 2,Ø,Ø
64Ø IF X<3 AND Y<59 THEN GOTO 72Ø
```

```
650 GOSUB 860
660 GOSUB 700
670 COLOR 1:SOUND 0,0,0,0:PLOT X,Y:COL
OR 3:PLOT J,K:GOTO 630
680 LOCATE X,Y,A:IF A=2 THEN GOTO 250
690 RETURN
700 LOCATE X,Y,A:IF A=2 THEN RESTORE :
GOTO 60
710 RETURN
720 X=1:Y=55:FOR S=1 TO 2:FOR I=255 TO
 1 STEP -4:SOUND 0,I,10,10
730 GOSUB 960:NEXT I
740 SETCOLOR 2,INT(RND(1)*16),0:NEXT S
:FOR I=255 TO 1 STEP -4:SOUND 0,I,8,10
:GOSUB 970:NEXT I
750 WAIT=10:FOR T=1 TO 20:SOUND 0,INT(
RND(1)*256),10,10:GOSUB 980:NEXT T:SOU
ND 0,0,0,0
760 WAIT=3:FOR I=1 TO 255 STEP 4:SOUND
 0,I,8,10:GOSUB 980:NEXT I
770 SOUND 0,0,0,0
780 GRAPHICS 2:SETCOLOR 4,4,6
790 POKE 709,12
800 POKE 710,0
810 ? "PRESS THE TRIGGER TO PLAY AGAIN
"
820 FOR Y=1 TO 500:IF STRIG(0)=0 THEN
RESTORE :GOTO 60
830 NEXT Y:GRAPHICS 0:POKE 752,1
840 POKE 709,12:POKE 710,0:POSITION 0,
12:? ,"     THE END"
850 GOTO 850
860 TIME=TIME+1:IF TIME=600 THEN GOTO
60
870 J=X:K=Y:IF STICK(0)=14 THEN Y=Y-1
880 IF STICK(0)=6 THEN X=X+1:Y=Y-1
890 IF STICK(0)=13 THEN Y=Y+1
900 IF STICK(0)=5 THEN Y=Y+1:X=X+1
910 IF STICK(0)=9 THEN Y=Y+1:X=X-1
920 IF STICK(0)=11 THEN X=X-1
930 IF STICK(0)=10 THEN Y=Y-1:X=X-1
940 IF STICK(0)=7 THEN X=X+1
950 RETURN
960 FOR W=1 TO 5:NEXT W:RETURN
970 FOR W=1 TO 5:NEXT W:RETURN
980 FOR W=1 TO WAIT:NEXT W:RETURN
990 GOSUB 1070
1000 FOR I=1 TO 255 STEP 20:SOUND 0,I,
8,10
1010 FOR T=1 TO 15:POKE 710,32+T:NEXT
T:NEXT I:SOUND 0,0,0,0
1020 GOSUB 1080
1030 RETURN
1040 LOCATE X,Y,A:IF A=2 THEN GOSUB 99
0
1050 IF RND(0)*200>1 THEN RETURN
1060 TX=X:TY=Y:COLOR 2:GOSUB 1070:PLOT
 X,Y:GOSUB 1070:DRAWTO X,Y:X=TX:Y=TY:R
ETURN
1070 X=INT(RND(0)*159):Y=INT(RND(0)*95
):RETURN
1080 HIT=HIT+1:IF HIT=4 THEN GOTO 60
1090 RETURN
1100 RUN
```

TYPO TABLE

Variable checksum = 244138

Line num range	Code	Length
5 - 60	IV	550
70 - 130	ER	519
140 - 210	ED	533
220 - 320	FJ	571
330 - 400	TY	521
410 - 460	LF	502
470 - 560	XR	554
570 - 630	PR	530
640 - 750	SK	585
760 - 870	WX	514
880 - 990	EP	425
1000 - 1100	EG	406

6502 DISASSEMBLER continued from page 77

```
SCR #3Ø
( FORTH DISASSEMBLER ANTIC 3/84 )
HEX Ø VARIABLE MULTIMODE -2 ALLOT
1D , 1E , 3C , 3D , 3E , 5C ,
5D , 5E , 7D , 7E , 9C , 9D ,
9E , BC , BD , BE , DC , DD ,
DE , FC , FD , FE ,

: SEARCH 1 + Ø DO OVER OVER I 2
    * + C@ - DUP Ø= IF DROP
    DROP DROP I 1 LEAVE ELSE
    Ø IF DROP DROP I Ø LEAVE
    ENDIF ENDIF LOOP ;

Ø< VARIABLE POINTER

-->
```

```
SCR #31
: STRING ( COMPILE TEXT )
    BL BLK @ IF BLK @ BLOCK ELSE
    TIB @ ENDIF IN @ + SWAP
    ENCLOSE IN +! OVER - >R +
    HERE R CMOVE R> ALLOT ;

Ø VARIABLE MULTINAME -2 ALLOT

STRING ORAASLBITANDROLJMPEORLSR
STRING ADCRORSTYSTASTXLDYLDALDX
STRING CPYCMPDECCPXSBCINC

: CHKMODE DROP DUP 2 * '
    MULTIMODE + @ POINTER @ C@ -
    4 /MOD SWAP IF SWAP 1+ SWAP
    ENDIF ;    -->
```

```
SCR #32
Ø VARIABLE ONEMODE -2 ALLOT
2CØØ , 2CØ8 , 28ØA , 3Ø1Ø ,
2C18 , 1Ø2Ø , 2C28 , 282A ,
3Ø3Ø , 2C38 , 2C4Ø , 2C48 ,
284A , 3Ø5Ø , 2C58 , 2C6Ø ,
2C68 , 286A , 246C , 3Ø7Ø ,
2C78 , 2C88 , 2C8A , 3Ø9Ø ,
2Ø96 , 2C98 , 2C9A , 14AØ ,
14A2 , 2CA8 , 2CAA , 3ØBØ ,
2ØB6 , 2CB8 , 2CBA , Ø4BE ,
2CC8 , 2CCA , 3ØDØ , 2CD8 ,
2CE8 , 2CEA , 3ØFØ , 2CF8 ,
ØØFF , ( ØØFF IS A DUMMY )


-->
```

```
SCR #33
Ø VARIABLE ONENAME -2 ALLOT
STRING BRKPHPASLBPLCLCJSRPLPROL
STRING BMISECRTIPHALSRBVCCLIRTS
STRING PLARORJMPBVSSEIDEYTXABCC
STRING STXTYATXSLDYLDXTAYTAXBCS
STRING LDXCLVTSXLDXINYDEXBNECLD
STRING INXNOPBEQSED???

Ø VARIABLE MODE -2 ALLOT
STRING ,X,Y,X)Y..##ØPX).Y().AIMRE

Ø VARIABLE LENGTH -2 ALLOT
2 C, 2 C, 1 C, 1 C, 2 C, 1 C,
1 C, 1 C, 1 C, 2 C, Ø C, Ø C,
1 C, Ø C,
-->
```

```
SCR #34
: PRINTNAME SPACE SWAP 3 * +
                3 TYPE 2 SPACES ;

: PRINTMODE 2 * ' MODE + 2 TYPE
                2 SPACES ;

: PRINTADD POINTER @ C@ DUP 2Ø
    = OVER 4Ø = OR OVER 4C = OR
    OVER 6Ø = OR SWAP 6C = OR
    SWAP ' LENGTH + C@ 1 POINTER
    +! POINTER @ OVER POINTER +!
    OVER Ø= IF DROP DROP ELSE
    OVER 1 = IF C@ . DROP ELSE
    @ Ø D. DROP ENDIF ENDIF ;

-->
```

```
SCR #35
: DISASSEMBLE POINTER ! CR
  BEG] CR
    POINTER @ DUP Ø D. 2 SPACES
    C@ ' ONEMODE 2D SEARCH
      IF ( FOUND ) DUP ' ONENAME
         PRINTNAME 2 * 1+
         ' ONEMODE + C@ 4 /
      ELSE ( NOT ) DROP POINTER @
         C@ ' MULTIMODE 16 SEARCH
         CHKMODE CHKMODE CHKMODE
         SWAP ' MULTINAME
         PRINTNAME ENDIF
    DUP PRINTMODE PRINTADD
    ?TERMINAL OR
  UNTIL ;
: DIS DISASSEMBLE ;
```



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7. Zonex: hidden color patters in grid
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2. Guy' Grid Game
3. Deathstar: from ANTIC V.1, No.2
4. Blackjack: Vegas rules
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6. Artillery: firing strategy game
7. Super Wumpus: text adventure

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2. Showdown
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3. Horses
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6. Spiral
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3. Home inventory
4. KEY 6: Cipher coding
5. Renumber
6. Compare: listings for differences
7. SUPER: menu
8. Modem
9. RT clock & more

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1. Disassembler: from ANTIC V.2, No.1
2. Tiny Text: from ANTIC V.1, No.6
3. GTIA text window: from ANTIC V.2, No.1
4. Label: disk label on Epson
5. Set up printer: sets up MX80 for Visicalc
6. Keyboard: tutorial & more

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1. Graphic
2. Draw
3. Rainbow
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5. Etch Sketch
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The potential buyer should note that these programs are sold *as is*. Their usefulness may depend on your experience with the computer. They may contain programming quirks that require some modification. However, all perform reasonably well. Contents of the disks may vary slightly from the published description due to unforseen circumstances, but each disk is filled to reasonable capacity with useful programs of the kind described. In most cases, there is no documentation except that in the program themselves. An excellent value at $10.00 each, plus $1.50 per order for shipping/handling. Send check or money order (payable to ANTIC Publishing), and disk number(s) to:

Public Domain Software
524 Second St.
San Francisco, CA 94107

Allow four weeks for delivery. All orders are sent by First Class Mail. California residents, please add 6½% sales tax.

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JOUST

Atari, Inc.
P.O. Box 427
Sunnyvale, CA 94086
(408) 745-2000
$49.95, 16K — cartridge

Reviewed by David Duberman

Imagine a unique, addictive arcade game that challenges fully without making you feel like an uncoordinated boob if you fail. You need imagine no longer, because **Joust** is here. Joust isn't that new — it's been a popular coin-op game for a couple of years. If you want to play-test the game, try your local arcade; the game play in the home computer version is almost identical.

In Joust, you fly a giant ostrich among two levels of floating stone islands and



the ground by flapping the wings with your fire button. Your opponents, the Buzzard Riders, attempt to dismount you, and you, them. When two flyers meet, the higher one wins. You're impervious to harm from contact with playfield objects, so you can bounce off surfaces to maneuver.

In upper levels, part of the ground vanishes to expose a lava pit complete with a troll who grabs and devours low-flying jousters. Some of the islands vanish temporarily, changing playfield characteristics significantly.

If you unseat an opponent, an egg appears in his place. If you don't grab it right away, it hatches another Buzzard Rider. Once you become adept at flying, it's a real joy to be able to skip off the backs of several of the enemy in a row, and to gobble up the eggs along the way.

Every few waves is an egg wave. When the round starts, every surface is covered with eggs, and you must get them all. If you're not quick enough, they hatch and become dangerous. Other special waves involve a vicious pterodactyl, a survival wave, and a team wave.

Joust's two-player mode is simultaneous, and involves both competitive and cooperative play. In general, the best two-player strategy is to mark off boundaries and stick to them, and the team wave rewards both players for success in this ploy. However, there is also a gladiator wave in the two-player version, in which the first player to dismount the other is rewarded.

Joust is one of the best arcade games ever released for Atari computers, and Atari's finest since Star Raiders. I played it every day for almost a month straight, and I can't think of another game for which that's true. I wholeheartedly recommend Joust — if Atari keeps this up, they'll be back in the black ink shortly. Now, if they'd only identify the programmers! By the way, if you need a quibble, there's no high-score feature.

SCREEN MAKER

Icon Software
925 Waverley St. #102
Palo Alto, CA 94301
$34.95, 48K — diskette

Reviewed by Julie Sickert

Have you ever dreamed of the perfect set of software tools? A series of utility programs that you could use to aid your own programming efforts — not tutorials, but real tools that would allow you to produce the graphics, sounds and animation you had always imagined were possible? Maybe you haven't owned your Atari very long, and are still new to programming. You have new ideas for games or graphics, but you've been too timid or inexperienced to pursue them on your own. Instead, you've probably resigned yourself to several years of studying PEEKs and POKEs before you'll be able to make the computer do what you want it to.

Well, you can stop dreaming. One of the tools you'll need for the innovative programs you've dreamed of is available now. **Screen Maker** can do exactly what you've envisioned, and more. Using Screen Maker, you can set up a single screen with up to 15 different graphics modes. And you can test the way your screen will appear by typing characters or using a joystick to draw figures in the text windows.

Sound too good to be true? There's more. Once you've designed a screen to your satisfaction, you can use Screen Maker to automatically generate the BASIC code required for that particular screen. Then, by means of a few short lines of code, you can include the screen as a subroutine to your own BASIC program. Screen Maker handles lists and memory — and you don't even have to know what a POKE is to use it!

Screen Maker uses the Atari BASIC cartridge, 48K of memory, and a disk drive. A joystick is optional. The software package includes the diskette and a concise but informative user's guide. The diskette contains two demonstration screens, which are thoroughly documented in the user's manual.

Screen Maker's options allow you to establish a new screen file, create a new screen, load and modify (or test) a screen, save a screen, or generate a subroutine. You can use the editor to create a screen by assigning graphics mode numbers or blank lines to different areas on the screen. After you've created a screen, you can save it as a file on your own formatted diskette. Screen Maker lets you define up to ten screens in a single session. You can also append a screen-subroutine file to your program and save the program and the subroutine together in a single file.

However, Screen Maker will not allow you to save the results of any tests you make on a screen. And there are some

continued on page 96



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limitations on the kinds of screen you can create. Since a window never wraps around the top or bottom of a screen, you can only combine graphics modes in patterns that will not interfere with the number of scan lines required for the different modes.

Despite these limitations, Screen Maker is invaluable as a utility tool. It provides the beginning programmer with an easy means of accomplishing what could otherwise be a very difficult task, by making available a set of creative graphics commands. If you are a novice programmer who wants a chance to be creative, Screen Maker is the tool you've been waiting for.

BASIC XL

Optimized Systems Software, Inc.
1173-D Saratoga-Sunnyvale
San Jose, CA 95129
(408) 446-3099
$99.00, 16K — cartridge

Reviewed by Jerry White

BASIC XL is the fastest and most powerful version of BASIC available for Atari computers. If you program in BASIC, or if you would like your BASIC programs to run faster, I highly recommend this language.

BASIC XL's special features include Microsoft-style string handling. Added to the standard Atari-style string commands are string arrays, including such string commands as FIND, LEFT$, MID$, RIGHT$, and PRINT USING.

New program development commands include LVAR, RENUM, and TRACE/TRACEOFF. LVAR instantly lists all variables in a program, including line numbers where one variable appears. RENUM provides line renumbering and references to constants. TRACE tells BASIC XL to display each line number as it is executed until a TRACEOFF command is encountered — an invaluable debugging aid.

Disk users will appreciate built-in DOS functions. If you haven't yet quite mastered Player/Missile graphics, BASIC XL's special commands give you full control of this technique.

To test BASIC XL's speed, I tried this test. First, I loaded a 220-line (880 statements) BASIC program into Atari BASIC. Next, I added the following fragment to the beginning:

```
0 POKE 20,0
1 FOR COUNT=1 TO 100
2 NEXT COUNT
3 ? PEEK(20):STOP
```

This routine counts to 100, then displays the number of 60ths of a second (jiffies) that it took. When I typed RUN, the result was 15, or one quarter of a second. I next entered the same lines starting at line 32700. Executing this routine with a GOTO 32700 command, the result was 91, just over one-and-one-half seconds. The reason the routine takes much longer near the end of the program is because of the way Atari BASIC executes FOR/NEXT loops. Each time the loop is executed, BASIC must search the entire program for the correct line to which to return.

When I tried the same test with BASIC XL, the routine at line 0 took 10 jiffies, and the routine at 32700 took 88.

BASIC XL provides a FAST command. FAST tells BASIC XL to perform a "precompile" of a program. All line numbers are changed to addresses, eliminating the need for a line number search. When I performed the above test with BASIC XL in the FAST mode, the routine at line 0 took 10 jiffies, and the routine at 32700 also took 10 jiffies. To recap, the ratio of improvement in the first routine was 15 to 10, and in the second it was 91 to 10. BASIC XL's FAST mode can make a real difference.

BASIC XL is compatible with most programs written in Atari BASIC. The 16K cartridge uses only 8K of your computer's RAM, thanks to bank switching. Some commercial BASIC programs, particularly utilities, may not work properly with BASIC XL.

The manual for BASIC XL is exceptional. The first section, an exhaustive tutorial entitled, "30 Days to Understanding BASIC XL," takes the novice by hand and walks him through the fundamentals of BASIC programming. Experienced programmers can proceed directly to the excellent 135-page reference section.

A truly outstanding computer deserves a truly outstanding BASIC. This is the language that should be built into Atari computers. Is anyone at Atari listening?

BC'S QUEST FOR TIRES and OIL'S WELL

Sierra On-Line
Sierra On-Line Building
Coarsegold, CA 93614
(209) 683-6858
$29.95, 40K — disk (Oil's Well)
$39.95, 40K — disk (Quest for Tires)

Reviewed by Harvey Bernstein

There is no denying that "cute" is in, both in the arcades and home software. Game writers, seeing the popularity of **Pac-Man** and **Q*Bert**, are starting to realize that most of us are turned off by the old "shoot the aliens and save the world" scenario. Both **BC's Quest for Tires** and **Oil's Well** fit nicely into the cute mold, as well as being successful graphically and satisfying to play.

For Quest for Tires, Sierra On-Line licensed the rights to the characters from Johnny Hart's popular comic strip, "B.C." The game is similar to the arcade game Moon Patrol. You control Thor, who, astride his trusty stone unicycle, traverses a horizontally scrolling landscape fraught with danger, in order to rescue Cute Chick. Along the way he must contend with potholes, rocks, logs, low branches, a lava pit and Fat Broad, who lies in wait with her club.

The animation is first-rate. Quest for Tires looks very much like an animated Sunday comics page. By varying the

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COMPUTER PALACE

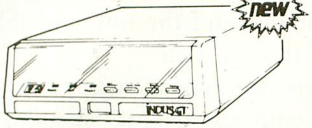
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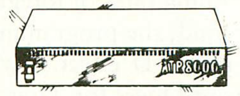
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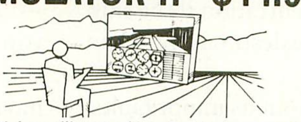
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scrolling rates of foreground and background, the programmers have created a nice 3-D effect. My one complaint about Quest for Tires lies in the game play. The first level is easy, and with a little practice, you can see all the screens almost immediately. The only difference between the first and succeeding levels is speed. The game might have had more staying power had each level introduced new elements, as in Donkey Kong or Miner 2049'er. As it is, I think most gamers will enjoy the game for a day or two, then relegate it to the shelf. It seems as though the programmers put so much effort into recreating the look of B.C. that they forgot about game play.

Moving from the Dawn of Man to the forefront of current technology brings us to Oil's Well. In this game, creatures named Oozies live underground and eat oil pipes, leaving behind land mines.

Each level shows a cut-away view of the drilling site, with the partially-built refinery above, and the mines below. You control an extensible pipeline and drill bit. You must maneuver through the maze of tunnels in the mine, eating oil pellets and avoiding Oozies and their bombs. If an Oozie is about to cross your pipeline, pressing the fire button retracts the pipe into the refinery. This retraction through the twists and tunnels of the maze, accompanied by a convincing sound effect, is what raises Oil's Well above the level of the dozens of Pac-Man clones on the market. I wish that Sierra had eschewed such maze-game clichés as bonus prizes and a super-pellet that slows everything down when eaten. Still, Oil's Well is an addicting game. Unlike Quest for Tires, game play starts out challenging, and graphics become more complex and detailed as the game progresses.

I can recommend BC's Quest for Tires for its animation, and Oil's Well for its game play. I hope that future arcade licenses of popular comic strips will be as successful graphically as Quest for Tires.

CLIPPER AROUND THE HORN IN 1850

PDI
11 Idar Court
Greenwich, CT 06830
(203) 661-8799
$29.95, 32K — disk
$29.95, 24K — cassette

Reviewed by John and Mary Harrison

Clipper Around the Horn in 1850 is an excellent simulation of a voyage often made by one of the fastest sailing vessels ever built, the clipper. As Captain, you choose the amount of cargo, the number of men and the amount of provisions that you need to maximize profits for your company. Once this task has been completed, you make a final review of the ship's log before setting sail from New York.

Once at sea, you must use your skills as a sailor to select the proper course and amount of sail for the wind and sea conditions you encounter. You must also be alert to the hazards that often befall such ships: mutiny, illness, storms, rogue waves, and running aground on rocks, ice or uncharted reefs. You can consult the ship's log and your charts to review the voyage's progress and plot your future course. It will require your total dedication and concentration if the ship is to reach its ultimate destination — San Francisco.

Clipper is not without its minor faults. Time stops when the cassette recorder is activated, which makes it impossible to adjust the sails or change course. And to view the charts, you must first leave the bridge, check the log book and return to the bridge; only then can you look at the charts. Finally, there is no indication of the passage of time when you are on the bridge. Days pass quickly, and only the log book tracks your progress.

On the positive side, the program's use of graphics and sound greatly enhances and adds realism to the voyage. The integration of the cassette recorder's voice track with the program makes possible a wealth of special sound effects — sea chanteys, words of advice from experienced captains, and the unforgettable sounds of the sea itself.

Written in Atari BASIC, Clipper runs smoothly with few delays. The ship's wheel turns as you change course, the ship pitches, and the sky darkens as storms approach. You actually get the feeling of running a sailing ship without having to go to sea.

Clipper is an exciting, challenging game that can sharpen your map reading, arithmetic and navigation skills. Not everyone who attempts to sail around the Horn will be successful, but with practice you should be able to reach San Francisco. Good luck and smooth sailing!

ZEPPELIN

Synapse Software
5221 Central Avenue
Richmond, CA 94804
(415) 527-7751
$34.95, 32K — disk or cassette
$34.95, 16K — cartridge

Reviewed by Richard Herring

Dot, dot, dot. Dash, dash, dash. Dot, dot, dot. So begins William Mataga's latest entry into the Atari game market — **Zeppelin.** When Count Ferdinand von Zeppelin designed his first rigid airship, he certainly did not imagine it navigating underground caverns filled with laser gates and crumbling rocks.

Zeppelin bears a certain resemblance to Magata's hit game Shamus. As the pilots of rigid airships, one to four players maneuver through a scrolling maze of winding horizontal and vertical passages. Three dangers must be confronted. First, enemy balloons and zeppelins patrol in fixed paths. Although you can dodge them, their patterns are often so tight that you must blast your way through.

Falling rocks, laser gates and barriers which block many passages are the second danger. Some of these can be

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COST — is small but features are many. You get graphics and adjustable tractors. Uses full size standard fan-fold paper. Just take it home, plug it in and you'll be printing in minutes. The GP-100AT Atari direct-connect printer comes with screen dump to provide spectacular graphics, and you can daisy-chain other peripherals. Again, NO 850 interface is required.

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SIMPLICITY — it's just like Atari's 850 interface, but without the four funny serial ports. Great for interfacing any parallel printer to your Atari computer. Can daisy-chain other peripherals, too. By the way, if you think up a name for this product, drop us a line. If we use it, we'll send you a color printer free. Contest ends 12-31-83.

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shot, others cannot. All of them may be turned off by hitting a toggle switch hidden nearby on a cavern wall. Third, since the screen scrolls constantly, you must maneuver carefully through the jagged rocks. At the intersections of passages, you have limited control over the direction the screen will scroll by steering your dirigible that way.

When your zeppelin collides with something, you lose one of your extra ships, but continue playing from where you were. Firing and maneuvering can be a bit tricky. Firing in a direction other than that in which the airship is moving will override your control of the ship's movement.

Progressing to lower levels of the caverns depends on your ability to explore and to use the objects you find. Your airship can carry, one at a time, explosives to open passageways between levels, keys to special locks, or food for the monsters which guard some passages. You will slowly develop fairly rigid patterns of movement in order to get the objects where they are needed. Drawing maps of the caverns may be not only useful, but even essential.

STAR LEAGUE BASEBALL

Gamestar Software
1302 State St.
Santa Barbara, CA 93101
(805) 963-3487
$31.95, 48K – disk

Reviewed by Gordon M. Wong

For every Walter Mitty who has dreamed of hitting a grand slam over the center field fence to win the game, **Star League Baseball** holds forth a chance at glory. It also offers superb graphics, animation, sound effects and music, and successfully blends the many nuances of baseball with excellent game play.

Star League's main screen is a baseball field viewed from high in the right field stands. From this vantage point, the ball's shadow gives you an idea of how far it is from the ground. The use of a shadow cue adds tremendously to the game: Low or high pitches, grounders or pop ups are all immediately identifiable. And the shadow cue, along with the detailed diamond (complete with dugouts and packed bleachers), helps to create a powerful illusion – the illusion that you really are watching and participating in a baseball game.

You can choose between two starting pitchers who have different pitching styles and also vary in terms of stamina and ball control. And if your starting pitcher begins to falter, fear not – after the seventh inning you're allowed to send in a relief pitcher!

The animation and sound effects are top-notch. The pitcher peers in at the catcher and winds up to throw, the batter can check swings, and fielders fling the ball about with enthusiasm. The game also includes many of the most beloved sounds of baseball: The roar of the crowd, the crack of the bat, and the thud of a ball landing in a mitt, as well as a sonorous rendition of the National Anthem and the stirring call of a trumpet ("charge") when a runner threatens to score.

Star League definitely has a learning curve; you should not expect to beat the computer team for some time. Joysticks are used to control almost all aspects of the game, and it takes time to learn to use them proficiently. For instance, the double play requires quite a bit of practice. There are also a number of tricks you will want to learn. You should, for example, mix up your pitches, and use changeups occasionally – they usually result in an easy out. And don't give up until the game is over. Some of my most exciting moments have taken place in the ninth inning of a Star League game.

The game does include certain compromises between game play and authenticity (for instance, all catching and running to first base are automatic), but on the whole these compromises serve to keep the game lively. I do think the game could use improvement in two areas, though. First, it needs a pause control. Second (realism aside), the computer pitcher should have to wait until the batter is ready to hit.

All in all, however, I highly recommend Star League Baseball to anyone who enjoys the sport, polished computer simulations, or both. It will keep your interest for a long time, impress your friends, and, most important of all, help fulfill your dreams. I've already hit three grand slams!

JUMPMAN JUNIOR

Epyx, Inc.
1043 Kiel Court
Sunnyvale, CA 94086
(408) 745-0700
$39.95, 16K – cartridge

Reviewed by David Faughn

Alas, things are still not going well at Earth's outpost on the far side of Jupiter. In a previous game, Jumpman was sent into action to defuse bombs placed in the Command Station by the Alternators, the Substation's dreaded enemies. Now Jumpman Junior, his apprentice, has been pressed into service on a similar endeavor.

Junior must move through the Substation's 12 levels (12 entirely new screens). Along the way, you must avoid hazards such as electrocution traps, moving walls, bullets that change direction in mid-flight, hellstones, blackouts and a multitude of other perils. The game starts with a brief preview of all the screens.

One to four players can play **Jumpman Junior**, and eight speed levels are available. Speeds 4 and 5 seem to be about right – don't try Speed 1 unless you can move a joystick faster than a hummingbird flaps its wings.

The game's graphics are excellent. The crumbling fortress that appears when you lose (I've seen this one often enough) is especially good. However, Jumpman Junior suffers from the same fault that

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Lakewood, California 90712

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(213) 804-1475

COMPUTERS IN TEACHING MATHEMATICS

(book)
Addison-Wesley Publishing Co.
Jacobs Way
Reading, MA 01867
(617) 944-8660
$13.95

Reading, writing and 'rithmetic will always be the basis of a good education, but the computer revolution is radicalizing the ways in which these subjects are being presented. **Computers in Teaching Mathematics** is a helpful text that supplies teachers with a number of ideas about the uses of computers in the instruction of mathematics.

T.A.C.

(game)
Microcomputer Games, Inc.
4517 Harford Rd.
Baltimore, MD 21214
(301) 254-5300
48K – diskette
$40.00

WWII history buffs will recognize **T.A.C.** as "Tactical Armor Command." As head of this division, you oversee tanks, anti-tank guns and infantry squads. Five different scenarios are possible, and non-nationalists will be pleased to note that, besides being able to command the American military, they can also lead German, British or Russian forces.

CYBER GRAPHICS

(graphics utility)
Rampage Computer Products, Inc.
952 Smokerise
Medina, OH 44256
(216) 722-3143
48K – diskette – $34.95

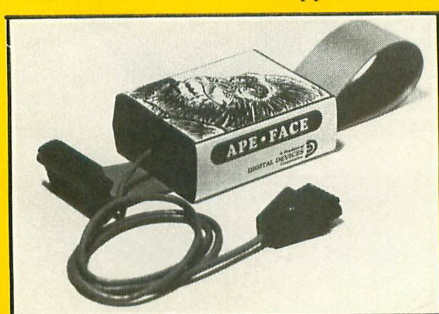
You can use all of the Atari graphics modes, including GTIA and those not available for BASIC, when using **Cyber Graphics**. Through use of this disk, both Player/Missiles and alternate character sets can be generated. Also, a Micro-Painter file can be stored to your BASIC program.



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(speech synthesizer)
Street Electronics Corp.
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(805) 684-4593
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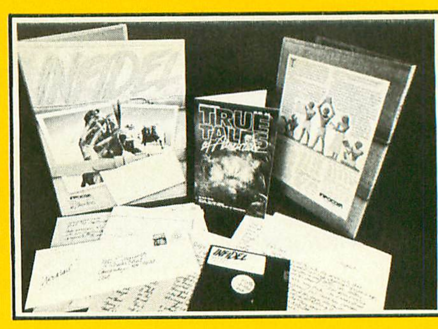
(printer cable)
Digital Devices Corp.
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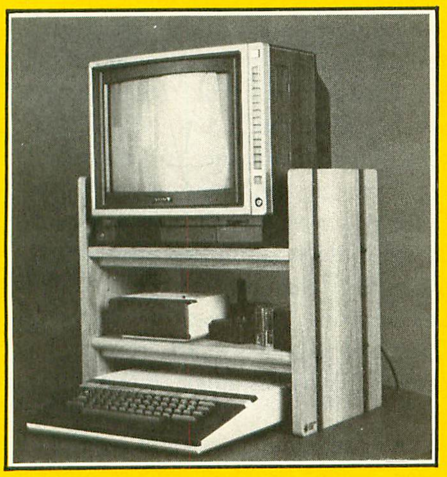


INFIDEL

(game)
Infocom, Inc.
55 Wheeler St.
Cambridge, MA 02138
(617) 492-1031
32K – diskette
$49.95

Set in the vast Egyptian desert, near the banks of the Nile, **Infidel** challenges you to find the buried entrance to the last great pyramid and to unearth its treasures. But, as leader of the expedition, you really blew it when you forced your workers to dig on a Holy Day. Now, you've been drugged and left for dead in the merciless desert, with only a crude map, a wax rubbing and an incomplete hieroglyphics dictionary for guidance. Nonetheless, you continue to face the desert and the pyramid's death traps alone to fulfill your quest.

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TIGER GRAPHICS

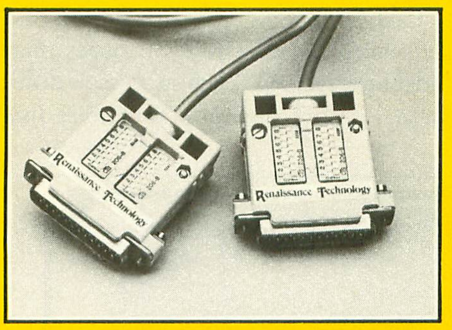
(graphics program)
Tiger Soft
91 Pocatello Trail
Henrietta, NY 14467
(716) 395-9980
48K – diskette
$34.99

The strength of **Tiger Graphics** lies in its ability to generate character sets. It automatically creates characters, and can open a new character set when one set is full. All ANTIC graphics modes are used, including GTIA and Mode 4, and can be mixed together in one display. The cursor can be programmed directly from the screen. Text can be added anywhere in the picture. Special features include a zoom effect, a special shading cursor for GTIA luminance modes and a display-list-interrupt editor.

1984 PROGRAMMER'S MARKET

(reference book)
Writer's Digest Books
9933 Alliance Rd.
Cincinnati, OH 45242
(513) 984-0717
$16.95

The **1984 Programmer's Market** gives you all the information necessary to sell your computer programs to the appropriate party. The first part of the book covers writing and marketing techniques, while the second portion contains 500 listings of software publishers. Also included is a bibliography of computer publications, a glossary of terms, and four indices to help you locate the publishers.



UNIVERSAL SERIAL CABLE

(printer cable)
Renaissance Technology Corp.
1045 Detroit Ave.
Concord, CA 94518
(415) 676-5757
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The **Universal Serial Cable** is said to eliminate the need for costly, custom-made, interconnect cables, to allow virtually any RS-232C serial computer and printer, or peripheral connection to be made quickly and easily. Two serial devices can be interfaced by simply adjusting a set of tiny DIP switches that are built into the cable's connectors.

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VISIONARY 1200

(modem)
Visionary Electronics, Inc.
141 Parker Ave.
San Francisco, CA 94118
(415) 751-8811
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Visionary 1200 is an intelligent, stand-alone 1200/300 baud modem that is able to send, receive and store messages automatically (even if the host computer is turned off). It contains up to 48K of battery-backed-up memory, and is said to be the only intelligent modem on the market that can conveniently send and receive TELEX and TWX messages to and from a computer's word processor. It also has its own internal clock/calendar.

NANOS SYSTEMS CARD

(reference guide)
Nanos Systems Corp.
P.O. Box 24344
Speedway, IN 46224
(317) 244-4078
$5.95
Add $1.00 for shipping and handling

Five months worth of research went into the compilation of the 22-page **Nanos Systems Card**. This quick reference guide for the Atari 400/800 throws light on subjects such as system commands, error codes, Player/Missile graphics, graphics modes and memory maps. Discounts are available for orders of 25 or more.

THE COMPUTER PHONE BOOK

(reference book)
New American Library
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(212) 397-8000
$9.95 U.S./$12.50 Canada

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has plagued many similar games: When you lose, you must start over from the first screen. This is unfortunate, because many of the advanced levels are more challenging (and more fun). But you can't get to them without enduring the relative tedium of the earlier screens.

ZOMBIES

Bram, Inc.
18779 Kenlahe Pl., NE
Seattle, WA 98155
(206) 486-8428
$34.95, 32K — disk or cassette

Reviewed by Roy D. Wolford

Zombies is a "non-shoot-em-up" adventure game with 3-D scrolling graphics. You can play Zombies by yourself or with a friend in the two-player cooperative mode. The music and sound effects are distinctive and well integrated. The graphics are good, with rich colors. You control your player with a joystick. On-line instructions are included — a nice touch.

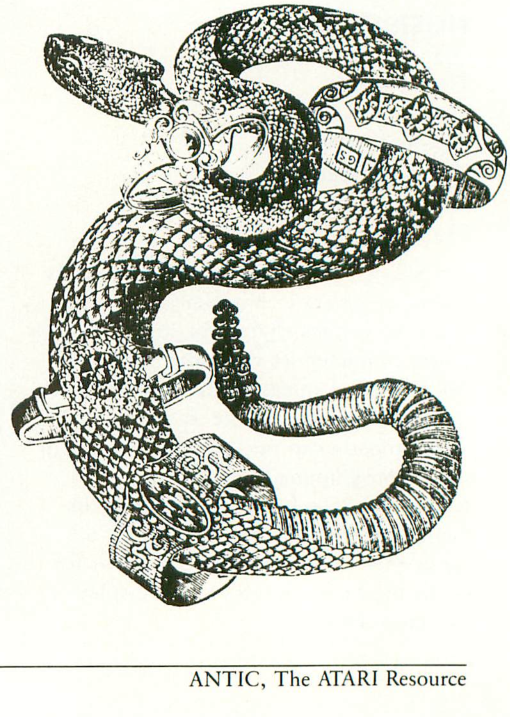
The object of the game is to recover seven magical crowns that are hidden in seven perilous dungeons. The creatures that inhabit the dungeons, including zombies, giant spiders, snakes and orbs, pursue you with a single-minded fervor. Usually they move very quickly, and they sometimes lurk at the base of ladders directly in your path. Also, your player tends to get hung up on corners and ladders. These elements make the game very challenging, if somewhat difficult to play.

Each dungeon contains about 10 screens to create a web of mazes that must be traversed. Each successive dungeon is more difficult. You must use quick reflexes, and strategically deploy magical crosses and cast magic spells to avoid the creatures or slow their pursuit. You drop a cross by pressing the fire button. Crosses temporarily freeze whatever touches them (including you!). Magic spells can be obtained by picking up scrolls located in some of the rooms. Once you have a spell, you can cast it by stopping your motion, pushing the fire button, then moving the joystick in the appropriate direction. There are three magic spells: freeze, confuse and project. Each lasts only a brief period of time.

The game ends after you recover all seven crowns or when your strength is drained to zero. At the end of play, you are given a rating based on your success in recovering crowns and avoiding creatures. High scores can be saved to disk.

A unique feature in Zombies is the cooperative two-player mode. You and a friend travel through the dungeons together. By cooperating on strategy, you can travel much farther than would be possible in the single-player game. If one player dies, the other can revive him.

Computer enthusiasts who enjoy quick-paced, challenging action games will like Zombie.



ATARI'S CINDERELLA continued from page 21

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STOP TIMER. CAUTION! RESET AS QUICKLY
AS POSSIBLE!
211Ø POKE 54Ø,LO:POKE 541,HI:REM TIMER
212Ø POKE 554,1:REM SET TIMER FLAG BYT
E TO NON-ZERO
213Ø POKE 66,Ø:REM START TIMER
214Ø ? :? :? "TIMER STARTED!"
215Ø COLOR INT(RND(Ø)*4):PLOT INT(RND(
Ø)*8Ø),INT(RND(Ø)*4Ø):DRAWTO INT(RND(Ø
)*8Ø),INT(RND(Ø)*4Ø)
216Ø IF PEEK(554) THEN 215Ø
217Ø ? :? :? "TIMED OUT!"
218Ø FOR X=1 TO 1ØØ:POKE 712,INT(RND(Ø
)*256):NEXT X:POKE 712,Ø:END
```

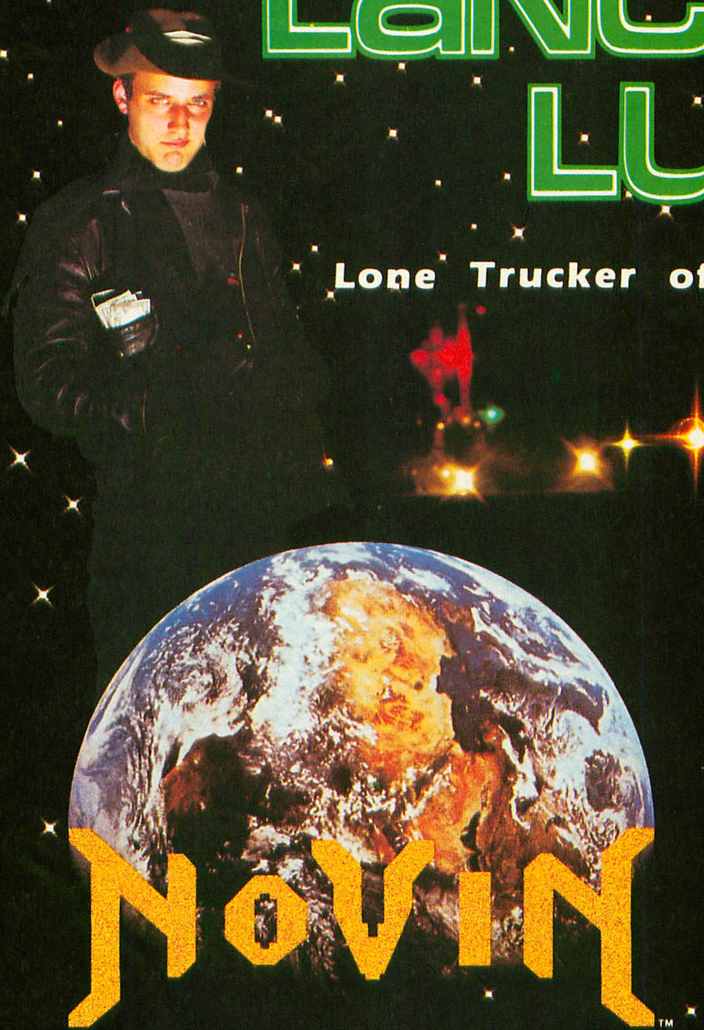
TYPO TABLE

Variable checksum = 1Ø2444

Line num range	Code	Length
2ØØØ – 21ØØ	BN	552
211Ø – 218Ø	DF	4ØØ

$Lance Lucre

Lone Trucker of the Spaceways!™



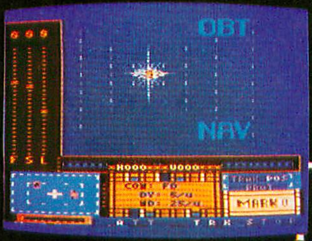


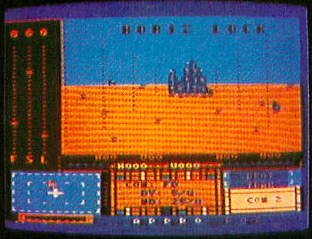
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LISTING CONVENTIONS

Table Information

Our custom font listings represent each ATASCII character as it appears on the video screen. You generate some characters by a single keystroke, for example, the regular alphabet. Others require a combination or sequence of keystrokes. In this table, ESC means *press and release* the escape key before pressing another key. CTRL or SHIFT means *press and hold* the control or shift key while simultaneously pressing the following key.

The Atari logo key (⅄) "toggles" inverse video for all alphanumeric and punctuation characters. Press the logo key once to turn it on; press again to turn it off. In the XL line there is no logo key; inverse video is controlled by a key on the function row. Decimal values are given as reference, and correspond to the CHR$ values often used in BASIC listings.

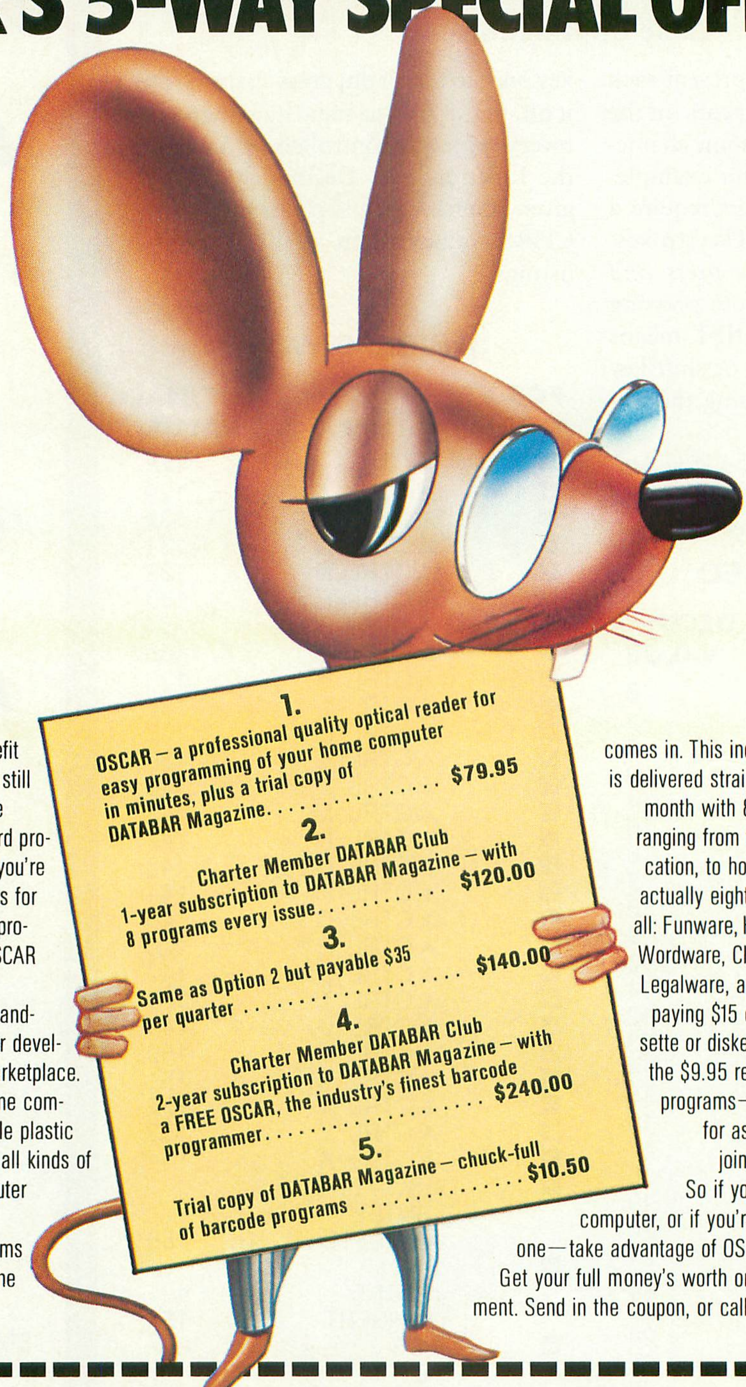
NORMAL VIDEO

FOR THIS	TYPE THIS	DECIMAL VALUE
	CTRL ,	0
	CTRL A	1
	CTRL B	2
	CTRL C	3
	CTRL D	4
	CTRL E	5
	CTRL F	6
	CTRL G	7
	CTRL H	8
	CTRL I	9
	CTRL J	10
	CTRL K	11
	CTRL L	12
	CTRL M	13
	CTRL N	14
	CTRL O	15
	CTRL P	16
	CTRL Q	17
	CTRL R	18
	CTRL S	19
	CTRL T	20
	CTRL U	21
	CTRL V	22
	CTRL W	23
	CTRL X	24
	CTRL Y	25
	CTRL Z	26
	ESC ESC	27
	ESC CTRL −	28
	ESC CTRL =	29
	ESC CTRL +	30
	ESC CTRL *	31
	CTRL .	96
	CTRL ;	123
|	SHIFT =	124
	ESC SHIFT CLEAR	125
	ESC DELETE	126
	ESC TAB	127

INVERSE VIDEO

FOR THIS	TYPE THIS	DECIMAL VALUE
	⅄CTRL ,	128
	⅄CTRL A	129
	⅄CTRL B	130
	⅄CTRL C	131
	⅄CTRL D	132
	⅄CTRL E	133
	⅄CTRL F	134
	⅄CTRL G	135
	⅄CTRL H	136
	⅄CTRL I	137
	⅄CTRL J	138
	⅄CTRL K	139
	⅄CTRL L	140
	⅄CTRL M	141
	⅄CTRL N	142
	⅄CTRL O	143
	⅄CTRL P	144
	⅄CTRL Q	145
	⅄CTRL R	146
	⅄CTRL S	147
	⅄CTRL T	148
	⅄CTRL U	149
	⅄CTRL V	150
	⅄CTRL W	151
	⅄CTRL X	152
	⅄CTRL Y	153
	⅄CTRL Z	154
	ESC SHIFT DELETE	156
	ESC SHIFT INSERT	157
	ESC CTRL TAB	158
	ESC SHIFT TAB	159
	⅄CTRL .	224
	⅄CTRL ;	251
	⅄SHIFT =	252
	ESC CTRL 2	253
	ESC CTRL DELETE	254
	ESC CTRL INSERT	255

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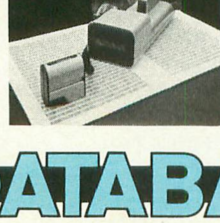
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GTIA RAINBOW

An Atari Kaleidoscope of 256 colors.

by MIKE WILDING

SYNOPSIS

Generates 256 colors on your monitor screen. Program requires 16K RAM, and your computer must be equipped with the GTIA chip. If used with an XL series Atari computer, Translator (see box page 85) must be run first.

This special program for ANTIC's international issue generates 256 colors on-screen simultaneously. Many programs generate 128 colors, but this is the first one we've seen that can handle twice that number.

Because GTIA Graphics Mode 9 can create 16 intensities and display list interrupts (DLI's) can be used to produce 16 basic colors, the Atari can now produce up to 256 (16 × 16) colors at one time. (The CTIA chip can generate only 128 colors, because it can handle only 8 intensities and 16 basic colors.)

The program draws 16 vertical bars (each of a different intensity) and then sets a DLI routine that "varies" the color 16 times over each bar. As a result, it generates 256 different intensities. The effect is a rainbow-like, subtle range of colors that is quite pleasing to the eye.

Mike Wilding, the author of this colorful program, sent it to ANTIC from England, but we understand that he is in Germany now, recovering from some sort of accident. We wish him a speedy recovery, and hope to see more of his multicolored works of programming art. —ANTIC ED

```
5 REM ANTIC MAGAZINE MARCH 1984
6 REM COLOR 256
7 REM BY WILDTHING
1Ø REM > ENTER MACHINE CODE ON PAGE 6
2Ø RESTORE :FOR A=Ø TO 3Ø:READ DA:POKE
 1536+A,DA:NEXT A
3Ø DATA 72,138,72,238,32,6,175,32,6,18
9,1ØØ,6,141,1Ø,212,141,26,2Ø8,224,16,2
Ø8,5,169,Ø,141,32,6,1Ø4,17Ø,1Ø4,64
4Ø REM > USE GR.9 AND ZERO COLOUR
5Ø GRAPHICS 9:POKE 712,Ø
6Ø REM > PLOT 16 COLOURS ON SCREEN
7Ø FOR A=1 TO 15:COLOR A:POKE 765,A
8Ø PLOT A*5+4,191:DRAWTO A*5+4,1:DRAWT
O A*5,1:POSITION A*5,191:XIO 18,#6,Ø,Ø
,"S:":NEXT A
9Ø REM > DRAW LINES TO MASK DLI's
1ØØ COLOR 15:FOR A=Ø TO 16:READ DA:PLO
T Ø,DA:DRAWTO 79,DA:PLOT Ø,DA+1:DRAWTO
 79,DA+1:NEXT A:PLOT Ø,1:DRAWTO Ø,191
11Ø DATA 1,12,24,36,48,6Ø,72,84,96,1Ø8
,12Ø,132,144,156,168,18Ø,19Ø
12Ø REM > CLEAR DLI TABLE ON PAGE 6
13Ø FOR A=1637 TO 1653:POKE A,Ø:NEXT A
14Ø REM > PLACE INTERUPTS IN DL
15Ø DL=PEEK(56Ø)+256*PEEK(561)
16Ø FOR A=Ø TO 15:READ DA:POKE DL+DA,1
43:NEXT A
17Ø DATA 6,16,28,41,53,65,77,89,1Ø2,11
4,126,138,15Ø,162,174,186
18Ø REM > VBLANK ROUTINE TO ZERO TABLE
19Ø FOR A=1576 TO 1583:READ DA:POKE A,
DA:NEXT A:DATA 169,Ø,141,32,6,76,2Ø9,2
31
2ØØ REM > START INTERUPT
21Ø POKE 546,4Ø:POKE 547,6:POKE 512,Ø:
POKE 513,6
22Ø POKE 54286,192
23Ø REM > FILL DLI TABLE IN SLOW TIME
24Ø FOR A=1 TO 15:POKE 1636+A,A*16:FOR
 B=Ø TO 3Ø:NEXT B:NEXT A
25Ø REM > ENDLESS LOOP TO SAVE SCREEN
26Ø GOTO 26Ø
```

TYPO TABLE

```
Variable checksum = 73852
    Line num range      Code   Length
    5       - 8Ø         PA     534
    9Ø      - 18Ø        QU     515
    19Ø     - 26Ø        NR     339
```

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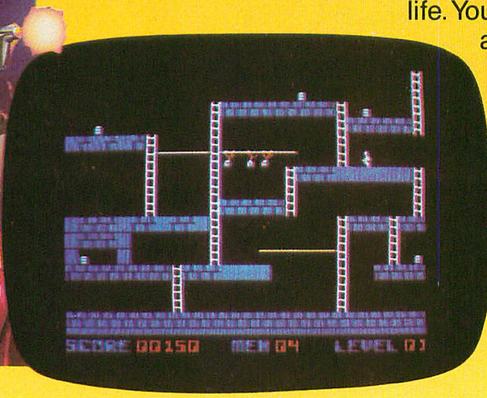




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